CE Radio Test Report

APPLICANT	**:**	**Texas Instruments Incorporated**
EQUIPMENT	**:**	**WiFi and Bluetooth Evaluation Board**
BRAND NAME	**:**	**Texas Instruments**
MODEL NAME	**:**	**WL1835MODCOM8B**
STANDARD	**:**	**ETSI EN 300 328 V1.8.1 (2012-06)**
TEST DATE(S)	**:**	**Dec. 04, 2013 ~ Jan. 06, 2014**

The measurements shown in this test report were made in accordance with the procedures given in EUROPEAN COUNCIL DIRECTIVE 1999/5/EC and found to be in compliance with ETSI Standard EN 300 328 V1.8.1 (2012-06).

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

TABLE OF CONTENTS

REVISION HISTORY **3**

SUMMARY OF TEST RESULT **4**

1 GENERAL DESCRIPTION **5**

1.1 Applicant 5
1.2 Manufacturer 5
1.3 Feature of Equipment Under Test 5
1.4 Details of Tested Sample (EUT) Information 6
1.5 Modification of EUT 6
1.6 Testing Facility 7
1.7 Applied Standards 7
1.8 Test Condition 7

2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST **8**

2.1 Descriptions of Test Mode 8
2.2 Connection Diagram of EUT Test Configurations 11
2.3 Supported Unit used in test configuration and system 12
2.4 EUT Operation Test Setup 12

3 TRANSMITTER PARAMETERS **13**

3.1 Maximum Transmit Power 13
3.2 Maximum Equivalent Isotropically Radiated Power (E.I.R.P.) Spectral Density 17
3.3 Occupied Channel Bandwidth 20
3.4 Frequency Hopping Requirements 23
3.5 Transmitter unwanted emissions in the out-of-band domain 31
3.6 Transmitter spurious emissions 35

4 RECEIVER PARAMETERS **49**

4.1 Receiver spurious emissions 49

5 ADAPTIVITY TEST **53**

5.1 Adaptivity and Receiver Blocking 53

6 PHOTOGRAPHS OF RADIATED EMISSION TEST CONFIGURATION **65**

7 LIST OF MEASURING EQUIPMENT **67**

8 UNCERTAINTY EVALUATION **69**

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
ER3N2752	Rev. 01	Initial issue of report	Jan. 20, 2014

SUMMARY OF TEST RESULT

CLAUSE (EN 300 328)	TEST PARAMETER	PASS/FAIL	REMARK
Transmitter Parameters			
4.3.1.1 4.3.2.1	Maximum Transmit Power	PASS	-
4.3.2.2	Maximum Equivalent Isotropically Radiated Power (E.I.R.P.) Spectral Density	PASS	Only applicable for modulations other than FHSS
4.3.1.7 4.3.2.6	Occupied Channel Bandwidth	PASS	-
4.3.1.3 4.3.1.4	Frequency Hopping Requirements	PASS	Only applicable for FHSS
4.3.1.8 4.3.2.7	Transmitter spurious emissions in OOB	PASS	-
4.3.1.9 4.3.2.8	Transmitter spurious emissions	PASS	Under limit 0.97 dB at 4944.000 MHz
Receiver Parameters			
4.3.1.10 4.3.2.9	Receiver spurious emissions	PASS	Under limit 6.19 dB at 1970.000 MHz
Adaptive Test Item			
4.3.1.6 4.3.2.5	Adaptivity	PASS	Only applicable for adaptive equipment Output Power >10dBm
4.3.1.11 4.3.2.10	Receiver Blocking	PASS	
Non-Adaptive Test Item			
4.3.1.2 4.3.2.3	Duty cycle, Tx-Sequence, Tx-gap	Not Required	Only applicable for non-adaptive equipment Output Power >10dBm
4.3.1.5 4.3.2.4	Medium Utilisation (MU) factor	Not Required	

Note:

1. Bluetooth belongs to adaptive equipment and EIRP > 10dBm.
2. WiFi belongs to adaptive equipment and EIRP > 10dBm.

1 General Description

1.1 Applicant

Texas Instruments Incorporated
12500 TI Boulevard M/S 8751. Dallas, TX 75243.

1.2 Manufacturer

Jorjin Technologies Inc.
17F, No. 239, Sec. 1, Datong Rd, Xizhi Dist. New Taipei City 221, Taiwan. R.O.C.

1.3 Feature of Equipment Under Test

The Equipment Under Test (hereafter called: EUT) is WiFi and Bluetooth Evaluation Board supporting, Wi-Fi 2.4GHz 802.11b/g/n and Bluetooth features, and below is details of information.

General Information of Equipment Under Test	
Equipment	WiFi and Bluetooth Evaluation Board
Brand Name	Texas Instruments
Model Name	WL1835MODCOM8B
Wi-Fi Specification	802.11b/g/n (HT20/HT40)
Bluetooth Version	v3.0 + EDR / v4.0 - LE
Power Supply	From test jig

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Details of Tested Sample (EUT) Information

<table>
<tr><th colspan="2">Product Specification subjective to this Test Standard</th></tr>
<tr><td>Transmitter / Receiver Frequency Range</td><td>2400 MHz ~ 2483.5 MHz</td></tr>
<tr><td>Number of Channels</td><td>WLAN : 13
Bluetooth : 79
Bluetooth 4.0 – LE: 40</td></tr>
<tr><td>Channel Spacing</td><td>WLAN : 5 MHz
Bluetooth : 1 MHz
Bluetooth 4.0 – LE: 2 MHz</td></tr>
<tr><td>Maximum EIRP Average Power</td><td><Ant. 1>
802.11b : 17.74 dBm
802.11g : 17.34 dBm
802.11n HT20 : 16.64 dBm
802.11n HT40 : 15.24 dBm
Bluetooth BR (1Mbps) : 11.84 dBm
Bluetooth 4.0 - LE (1Mbps) : 10.44 dBm
MIMO <Ant. 1+2>
802.11n HT20 : 18.14 dBm</td></tr>
<tr><td>Antenna Type / Gain</td><td>WLAN: Antenna 1: Chip Antenna / -0.36 dBi
Antenna 2: Chip Antenna / 1.22 dBi
Bluetooth : Antenna 1: Chip Antenna / -0.36 dBi</td></tr>
<tr><td>Type of Modulation</td><td>Bluetooth 3.0 BR (1Mbps) : GFSK
Bluetooth 3.0 EDR (2Mbps) : π/4-DQPSK
Bluetooth 3.0 EDR (3Mbps) : 8-DPSK
Bluetooth 4.0 - LE : GFSK
802.11b : DSSS (DBPSK / DQPSK / CCK)
802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><th></th><th>Ant. 1</th><th>Ant. 2</th></tr>
<tr><td>Bluetooth v3.0</td><td>V</td><td>-</td></tr>
<tr><td>Bluetooth v4.0</td><td>V</td><td>-</td></tr>
<tr><td>802.11 b</td><td>V</td><td>-</td></tr>
<tr><td>802.11 g</td><td>V</td><td>-</td></tr>
<tr><td>802.11 n HT20 SISO</td><td>V</td><td>-</td></tr>
<tr><td>802.11 n HT20 MIMO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n HT40</td><td>V</td><td>-</td></tr>
</table>
</td></tr>
<tr><td>EUT Stage</td><td>Production Unit</td></tr>
</table>

Note: For other wireless features of this EUT, test report will be issued separately.

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Facility

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No. :** 05CH02-HY ; 05CH01-HY ; TH02-HY

1.7 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of **ETSI EN 300 328 V1.8.1 (2012-06).**

Note: All test items were verified and recorded according to the standards and without any deviation during the test.

1.8 Test Condition

Normal Voltage	DC 3.7V
Normal Temperature	25℃
Extreme Temperature	-30℃ and 70℃

Note: The test temperature was between -30˚C ~ 70˚C by manufacturer requested.

2 Test Configuration of Equipment under Test

2.1 Descriptions of Test Mode

a. Preliminary tests were performed in different data rate and recorded the RF power output in the following tables:

<Ant. 1>

Average Bluetooth RF Output Power (dBm)			
Data rate	1Mbps	2Mbps	3Mbps
Avg. Power	12.10	7.60	7.60

Note:

Data rate Bluetooth 1Mbps was chosen to be tested due to the highest RF output power.

Average Bluetooth 4.0 - LE RF Output Power (dBm)			
Data Rate	CH 00	CH 19	CH 39
Avg. Power	10.30	10.30	9.90

2.4GHz 802.11b RF Output Power (dBm)				
Data rate	1Mbps	2Mbps	5.5Mbps	11Mbps
Avg. Power	16.20	16.10	16.10	16.10

2.4GHz 802.11g RF Output Power (dBm)								
Data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Avg. Power	16.30	16.20	16.20	16.20	15.30	14.50	13.90	13.20

2.4GHz 802.11n HT40 RF Output Power (dBm)								
Data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Avg. Power	13.90	13.80	13.80	13.80	13.80	13.80	12.80	11.50

SISO <Ant. 1>

2.4GHz 802.11n HT20 RF Output Power (dBm)								
Data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Avg. Power	15.30	15.20	15.20	15.20	14.60	14.00	13.40	12.30

MIMO <Ant. 1+2>

2.4GHz 802.11n HT20 RF Output Power (dBm)								
Data rate	**MCS8**	**MCS9**	**MCS10**	**MCS11**	**MCS12**	**MCS13**	**MCS14**	**MCS15**
Avg. Power	**18.00**	17.90	17.90	17.90	17.60	17.10	13.40	12.60

Note:

The data rates of WLAN 802.11b/g/n were set in 1Mbps for 802.11b (Ant. 1), 6Mbps for 802.11g (Ant. 1), MCS0 for 802.11n HT20 (Ant. 1), MCS8 for 802.11n HT20 (Ant. 1+2), MCS0 for 802.11n HT40 (Ant. 1) with both antennas transmit due to the highest RF output power for rest of test items.

b. During radiated spurious emissions testing, the interface cables and equipment positions were varied according to European Standard EN 300 328 V1.8.1 (2012-06), and the frequency range of radiation was investigated from 25 MHz to 12750 MHz.

Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

Test Modes		
RF	**802.11b DSSS**	**802.11g OFDM**
Tx	802.11b CH01 (2412MHz) for Ant. 1 **802.11b CH13 (2472MHz) for Ant. 1**	**802.11g CH01 (2412MHz) for Ant. 1** 802.11g CH13 (2472MHz) for Ant. 1
Rx	802.11b CH13 (2472MHz) for Ant. 1	**-**

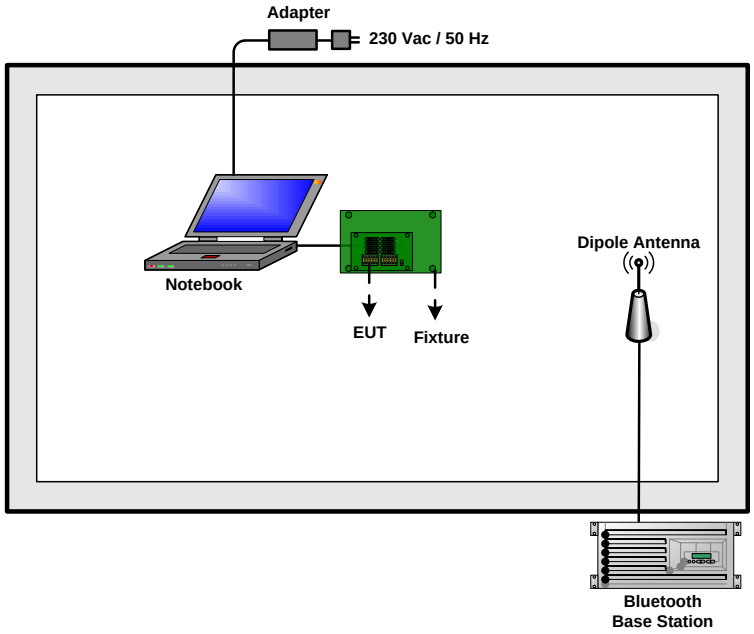
Test Modes		
RF	**802.11n HT20 OFDM**	**802.11n HT40 OFDM**
Tx	802.11n HT20 CH01 (2412MHz) for MIMO <Ant. 1+2> 802.11n HT20 CH13 (2472MHz) for MIMO <Ant. 1+2> **802.11n HT20 CH01 (2412MHz) for SISO <Ant. 1>**	**802.11n HT40 CH03 (2422MHz) for Ant. 1** 802.11n HT40 CH11 (2462MHz) for Ant. 1
Rx	**802.11n HT20 CH01 (2412MHz) for SISO <Ant. 1>**	**-**

Test Modes		
RF	**Bluetooth (1Mbps) GFSK**	**Bluetooth 4.0 - LE GFSK**
Tx	**Bluetooth (1Mbps) CH00 (2402MHz) for Ant. 1** Bluetooth (1Mbps) CH78 (2480MHz) for Ant. 1	**Bluetooth 4.0 - LE CH00 (2402MHz) for Ant. 1** Bluetooth 4.0 - LE CH39 (2480MHz) for Ant. 1
Rx	Bluetooth (1Mbps) CH00 (2402MHz) for Ant. 1	Bluetooth 4.0 - LE CH00 (2402MHz) for Ant. 1

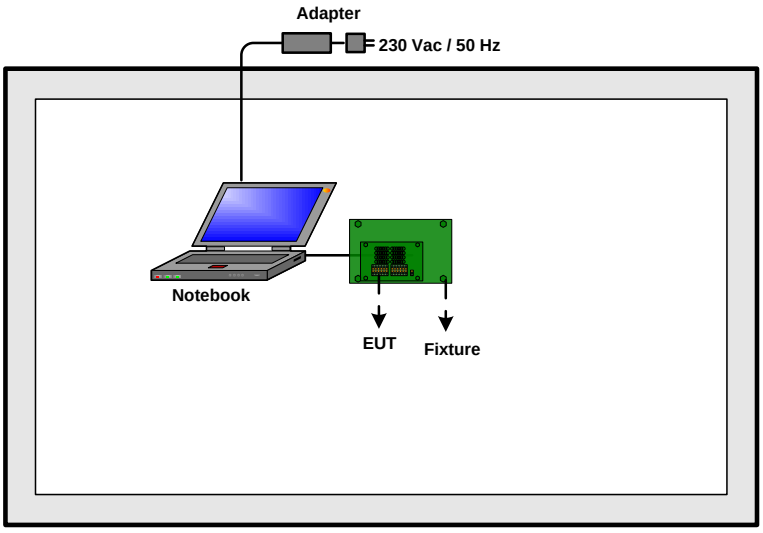
Remark: All test modes of the Transmitter Radiated Spurious Emission (RSE) and Receiver Radiated Spurious Emission (RSE) were tested; only the test worse data in bold of these modes were reported.

2.2 Connection Diagram of EUT Test Configurations

<Bluetooth Tx/Rx Mode>



<WLAN Tx/Rx Mode>



2.3 Supported Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	Lenovo	G480	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
4.	Fixture	N/A	WG7XXXT01	N/A	N/A	N/A
5.	Adapter	Aviv Energy	HK-IP15-A05	N/A	N/A	Unshielded, 1.8 m

2.4 EUT Operation Test Setup

For Bluetooth test items, a programmed RF utility, “HCT Tester” was installed in notebook which was programmed in order to make the EUT get into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

For WLAN and Bluetooth 4.0 – LE test items, programmed RF utility, “HCT Tester” installed in the notebook make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

3 Transmitter Parameters

3.1 Maximum Transmit Power

3.1.1 Limit of Effective Isotropic Radiated Power

SUBCLAUSE 4.3.1.1.2 and 4.3.2.1.2	
TEST CONDITION	**LIMIT**
Normal and Extreme Temperature Conditions	20dBm (e.i.r.p)

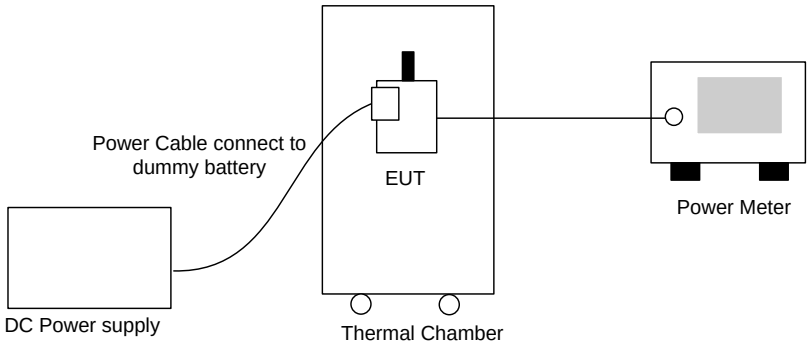
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 7 of this test report.

3.1.3 Test Procedure

1. The measurement procedure follows the clause 5.3.2.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. Placing the EUT in thermal chamber.
3. The EUT is connected to external power supply.
4. Setting thermal chamber temperature and power supply voltage at suitable values.
5. The EIRP = A+G+Y, where A is the power measured, G is the assembly gain of the individual antenna of the EUT in dBi and Y is the additional beamforming gain of the EUT in dB if applicable, here, Y=0.

3.1.4 Test Setup



3.1.5 Test Results

Test Item :	EIRP Power	Temperature :	24~26℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	Conducted Power (dBm)			Gain (dBi)	Pass/Fail
					T nom	T min	T max		
					25 ℃	-30 ℃	70 ℃		
11b	1Mbps	1	1	2412	15.80	18.10	16.50	-0.36	Pass
11b	1Mbps	1	7	2442	16.20	17.60	16.80	-0.36	Pass
11b	1Mbps	1	13	2472	15.90	17.90	17.00	-0.36	Pass
11g	6Mbps	1	1	2412	13.60	14.90	13.90	-0.36	Pass
11g	6Mbps	1	7	2442	16.30	17.70	16.80	-0.36	Pass
11g	6Mbps	1	13	2472	13.10	15.10	14.10	-0.36	Pass
HT20	MCS0	1	1	2412	13.60	15.00	14.10	-0.36	Pass
HT20	MCS0	1	7	2442	15.30	17.00	16.00	-0.36	Pass
HT20	MCS0	1	13	2472	13.30	15.10	14.10	-0.36	Pass
HT40	MCS0	1	3	2422	11.50	13.00	12.00	-0.36	Pass
HT40	MCS0	1	7	2442	13.70	15.50	14.50	-0.36	Pass
HT40	MCS0	1	11	2462	13.90	15.60	14.50	-0.36	Pass
BT2.0	1Mbps	1	0	2402	12.10	12.20	11.70	-0.36	Pass
BT2.0	1Mbps	1	39	2441	12.00	11.90	11.50	-0.36	Pass
BT2.0	1Mbps	1	78	2480	12.10	11.80	11.30	-0.36	Pass
BT4.0	1Mbps	1	0	2402	10.30	10.80	10.20	-0.36	Pass
BT4.0	1Mbps	1	19	2440	10.30	10.70	10.20	-0.36	Pass
BT4.0	1Mbps	1	39	2480	9.90	10.30	9.90	-0.36	Pass

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	EIRP Power (dBm)			Power Limit (dBm)	Pass/Fail
					T nom	T min	T max		
					25 ℃	-30 ℃	70 ℃		
11b	1Mbps	1	1	2412	15.44	17.74	16.14	20	Pass
11b	1Mbps	1	7	2442	15.84	17.24	16.44	20	Pass
11b	1Mbps	1	13	2472	15.54	17.54	16.64	20	Pass
11g	6Mbps	1	1	2412	13.24	14.54	13.54	20	Pass
11g	6Mbps	1	7	2442	15.94	17.34	16.44	20	Pass
11g	6Mbps	1	13	2472	12.74	14.74	13.74	20	Pass
HT20	MCS0	1	1	2412	13.24	14.64	13.74	20	Pass
HT20	MCS0	1	7	2442	14.94	16.64	15.64	20	Pass
HT20	MCS0	1	13	2472	12.94	14.74	13.74	20	Pass
HT40	MCS0	1	3	2422	11.14	12.64	11.64	20	Pass
HT40	MCS0	1	7	2442	13.34	15.14	14.14	20	Pass
HT40	MCS0	1	11	2462	13.54	15.24	14.14	20	Pass
BT2.0	1Mbps	1	0	2402	11.74	11.84	11.34	20	Pass
BT2.0	1Mbps	1	39	2441	11.64	11.54	11.14	20	Pass
BT2.0	1Mbps	1	78	2480	11.74	11.44	10.94	20	Pass
BT4.0	1Mbps	1	0	2402	9.94	10.44	9.84	20	Pass
BT4.0	1Mbps	1	19	2440	9.94	10.34	9.84	20	Pass
BT4.0	1Mbps	1	39	2480	9.54	9.94	9.54	20	Pass

Mod.	Data Rate	N_{TX}	Ant.	Channel	Freq. (MHz)	Conducted Power (dBm)			Gain (dBi)	Pass/Fail
						T nom	T min	T max		
						25 ℃	-30 ℃	70 ℃		
HT20	MCS8	2	1+2	1	2412	15.80	16.80	15.50	-0.36	Pass
HT20	MCS8	2	1+2	7	2442	18.00	18.50	17.80	-0.36	Pass
HT20	MCS8	2	1+2	13	2472	16.20	16.60	15.10	-0.36	Pass

Mod.	Data Rate	N_{TX}	Ant.	Channel	Freq. (MHz)	EIRP Power (dBm)			Power Limit (dBm)	Pass/Fail
						T nom	T min	T max		
						25 ℃	-30 ℃	70 ℃		
HT20	MCS8	2	1+2	1	2412	15.44	16.44	15.14	20	Pass
HT20	MCS8	2	1+2	7	2442	17.64	18.14	17.44	20	Pass
HT20	MCS8	2	1+2	13	2472	15.84	16.24	14.74	20	Pass

Note:

EIRP = measured average power has offset cable loss + antenna gain.

For example: antenna gain = -0.36 dBi at Ch01, 2412MHz,

EIRP = 15.80 dBm (measured average power has offset cable loss) + (-0.36) dBi (antenna gain) = 15.44 dBm

3.2 Maximum Equivalent Isotropically Radiated Power (E.I.R.P.) Spectral Density

3.2.1 Limit of Maximum Power Spectral Density

SUBCLAUSE 4.3.2.2.2	
TEST CONDITION	**LIMIT**
Normal and Extreme Temperature Conditions	10dBm / MHz

Remark: Maximum spectral power density is not applicable to FHSS system device.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 7 of this test report.

3.2.3 Test Procedure

1. The measurement procedure follows the clause 5.3.3.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. These measurements shall only be performed at normal test conditions.
3. The measurement shall be repeated for the equipment being configured to operate at the lowest, the middle, and the highest frequency of the stated frequency range.
4. The test procedure shall be as follows:

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

Start Frequency	2400MHz
Stop Frequency	2483.5MHz
Resolution BW	10kHz
Video BW	30kHz
Sweep Points	8350
Detector	RMS
Trace Mode	Max Hold
Sweep time	Auto

Step 2:

Add up the values for amplitude (power) for all the samples in the file.

Step 3:

Normalize the individual values for amplitude so that the sum is equal to the RF Output Power (e.i.r.p.) measured.

Step 4:

Starting from the first sample in the file (lowest frequency), add up the power of the following samples representing a 1 MHz segment and record the results for power and position (i.e. sample #1 to #100). This is the Power Spectral Density (e.i.r.p.) for the first 1 MHz segment which shall be recorded.

Step 5:

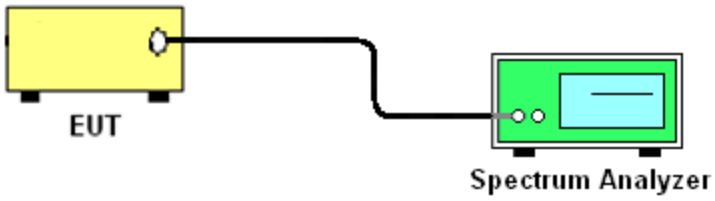
Shift the start point of the samples added up in step 4 by 1 sample and repeat the procedure in step 4 (i.e. sample #2 to #101).

Step 6:

Repeat step 5 until the end of the data set and record the radiated Power Spectral Density values for each of the 1 MHz segments.

From all the recorded results, the highest value is the maximum Power Spectral Density for the EUT. This value shall be recorded in the test report.

3.2.4 Test Setup



3.2.5 Test Results

Test Item :	EIRP Power Density	Temperature :	24~26℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	Channel	Freq. (MHz)	EIRP Power Density (dBm/MHz)	Max. Limits (dBm/MHz)	Pass/Fail
11b	1Mbps	1	1	2412	8.37	10	Pass
11b	1Mbps	1	7	2442	8.68	10	Pass
11b	1Mbps	1	13	2472	8.33	10	Pass
11g	6Mbps	1	1	2412	3.91	10	Pass
11g	6Mbps	1	7	2442	7.17	10	Pass
11g	6Mbps	1	13	2472	3.66	10	Pass
HT20	MCS0	1	1	2412	4.06	10	Pass
HT20	MCS0	1	7	2442	5.92	10	Pass
HT20	MCS0	1	13	2472	3.77	10	Pass
HT40	MCS0	1	3	2422	-0.97	10	Pass
HT40	MCS0	1	7	2442	1.42	10	Pass
HT40	MCS0	1	11	2462	1.44	10	Pass
BT4.0	1Mbps	1	0	2402	9.89	10	Pass
BT4.0	1Mbps	1	19	2440	9.89	10	Pass
BT4.0	1Mbps	1	39	2480	9.49	10	Pass

Mod.	Data Rate	N_{TX}	Ant.	Channel	Freq. (MHz)	EIRP Power Density (dBm/MHz)	Max. Limits (dBm/MHz)	Pass/Fail
HT20	MCS8	2	1+2	1	2412	6.18	10	Pass
HT20	MCS8	2	1+2	7	2442	8.66	10	Pass
HT20	MCS8	2	1+2	13	2472	6.58	10	Pass

3.3 Occupied Channel Bandwidth

3.3.1 Limit of Occupied Channel Bandwidth

Occupied Channel Bandwidth fall completely within 2.4 GHz – 2.4835 GHz

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 7 of this test report.

3.3.3 Test Procedure

1. The measurement procedure follows the clause 5.3.8.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. The measurement shall be performed only on the lowest and the highest frequency within the stated frequency range.
3. The test procedure shall be as follows:

Step 1:

Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	Channel under test
Resolution BW	1 % of the span
Video BW	3 × RBW
Frequency Span	2 × Occupied Channel Bandwidth (e.g. 40 MHz for a 20 MHz channel)
Detector	RMS
Trace Mode	Max Hold

Step 2:

Wait until the trace is completed.

Find the peak value of the trace and place the analyzer marker on this peak.

Step 3:

Use the 99 % bandwidth function of the spectrum analyzer to measure the Occupied Channel Bandwidth of the EUT.

3.3.4 Test Setup

3.3.5 Test Results

Test Item :	99% Occupied BW	Temperature :	24~26℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	Chain Port	Channel	Freq. (MHz)	99% OBW (MHz)	FL (MHz)	FH (MHz)	Pass/Fail
11b	1Mbps	1	1	1	2412	15	2404.520	2419.520	Pass
11b	1Mbps	1	1	13	2472	15.04	2464.480	2479.520	Pass
11g	6Mbps	1	1	1	2412	17.24	2403.400	2420.640	Pass
11g	6Mbps	1	1	13	2472	17.24	2463.400	2480.640	Pass
HT20	MCS0	1	1	1	2412	18.16	2402.960	2421.120	Pass
HT20	MCS0	1	1	13	2472	18.32	2462.840	2481.160	Pass
HT40	MCS0	1	1	3	2412	36.24	2403.840	2440.080	Pass
HT40	MCS0	1	1	11	2472	36.8	2443.600	2480.400	Pass
BT2.0	1Mbps	1	1	0	2402	0.831	2401.577	2402.408	Pass
BT2.0	1Mbps	1	1	78	2480	0.822	2479.580	2480.402	Pass
BT2.0	2Mbps	1	1	0	2402	1.164	2401.412	2402.576	Pass
BT2.0	2Mbps	1	1	78	2480	1.164	2479.412	2480.576	Pass
BT2.0	3Mbps	1	1	0	2402	1.164	2401.427	2402.591	Pass
BT2.0	3Mbps	1	1	78	2480	1.161	2479.427	2480.588	Pass
BT4.0	1Mbps	1	1	0	2402	1.011	2401.502	2402.513	Pass
BT4.0	1Mbps	1	1	39	2480	1.017	2479.499	2480.516	Pass

Mod.	Data Rate	N_{TX}	Ant.	Channel	Freq. (MHz)	99% OBW (MHz)	FL (MHz)	FH (MHz)	Pass/Fail
HT20	MCS8	2	1+2	1	2412	18.28	2402.880	2421.160	Pass
HT20	MCS8	2	1+2	13	2472	18.32	2462.840	2481.160	Pass

3.4 Frequency Hopping Requirements

3.4.1 Dwell Time and Minimum Frequency Occupation Time

3.4.1.1 Limit of Dwell Time

SUBCLAUSE 4.3.1.3.2	
TEST CONDITION	**LIMIT**
Non-Adaptive Frequency Hopping Systems	15 ms within 15ms * hopping frequencies (N)
Adaptive Frequency Hopping Systems	0.4s within 0.4s * hopping frequencies (N)

Limit of Minimum Frequency Occupation Time

SUBCLAUSE 4.3.1.3.2	
TEST CONDITION	**LIMIT**
Normal and Extreme Temperature Conditions	The Minimum Frequency Occupation Time shall be equal to one dwell time within a period not exceeding four times the product of the dwell time per hop and the number of hopping frequencies in use.

Remark: This test item is not applicable to DSSS/OFDM device.

3.4.1.2 Measuring Instruments

The measuring equipment is listed in the section 7 of this test report.

3.4.1.3 Test Procedures

1. The measurement shall be performed on a minimum of 2 hopping frequencies chosen arbitrary from the actual hopping sequence. The results as well as the frequencies on which the test was performed shall be recorded in the test report.
2. The measurement procedure follows the clause 5.3.4.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).
3. The analyzer shall be set as follows:

Center Frequency	Channel under test
Frequency Span	0 Hz
Resolution BW	300kHz
Video BW	300kHz
Detector	RMS
Sweep time	Equal to the Dwell Time × Minimum number of hopping frequencies (N)
Number of sweep points	30000
Trace Mode	Clear / Write
Trigger	Free Run

4. For accuracy measurement, the sweep time would be zoomed in and verify the dwell time which is from the dwell time per hop across the total number of hopping channel. Then record test result in the section 3.4.1.5.
5. Make the following changes on the analyzer to get Minimum Frequency Occupation Time
   Sweep time: Equal to 4 × Dwell Time × Actual number of hopping frequencies in use

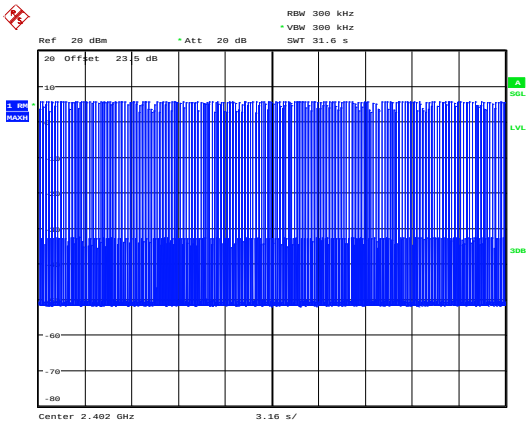
3.4.1.4 Test Setup

3.4.1.5 Test Results

Test Item :	Dwell Time and Occupation time	Temperature :	24~26℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

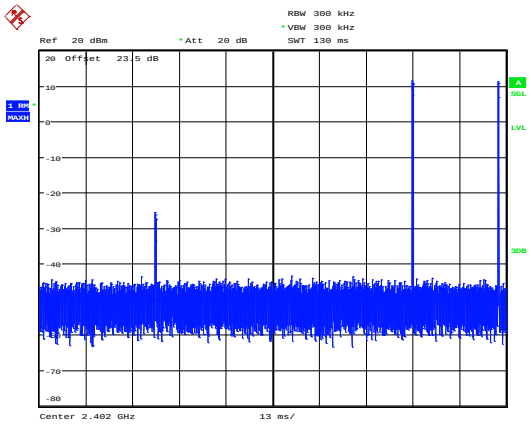
BT (Hopping Mode)		Dwell Time per hop(ms)	Dwell Time(ms)	Dwell Time Max. Limit (ms)	Frequency Occupation Time (ms)	Frequency Occupation Time min. Limit (ms)	Pass /Fail
DH1	2402 MHz	0.40	337.07	400	2.78	0.40	Pass
	2480 MHz	0.40	336.01	400	2.84	0.40	Pass
DH3	2402 MHz	1.67	271.76	400	6.54	1.67	Pass
	2480 MHz	1.67	270.71	400	19.49	1.67	Pass
DH5	2402 MHz	2.92	356.03	400	11.65	2.92	Pass
	2480 MHz	2.92	323.37	400	34.94	2.92	Pass

Dwell Time - Channel 00 DH1



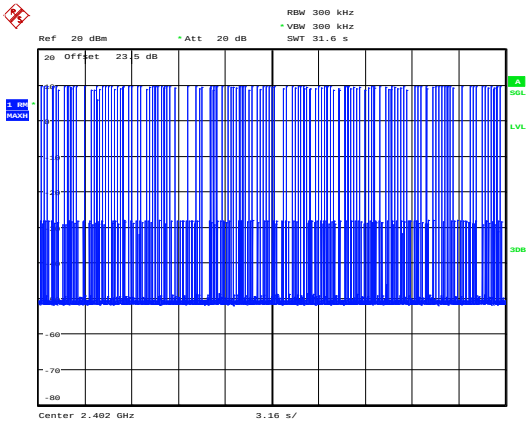
Date: 25.DEC.2013 23:44:29

Frequency Occupation Time - Channel 00 DH1



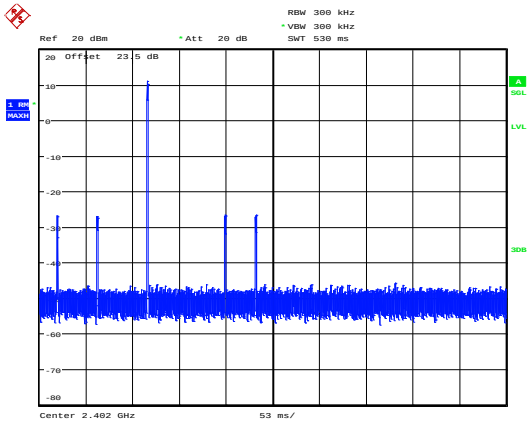
Date: 25.DEC.2013 23:44:38

Dwell Time - Channel 00 DH3



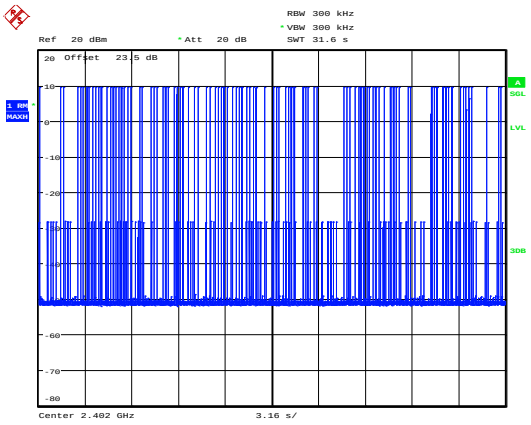
Date: 25.DEC.2013 23:56:00

Frequency Occupation Time - Channel 00 DH3



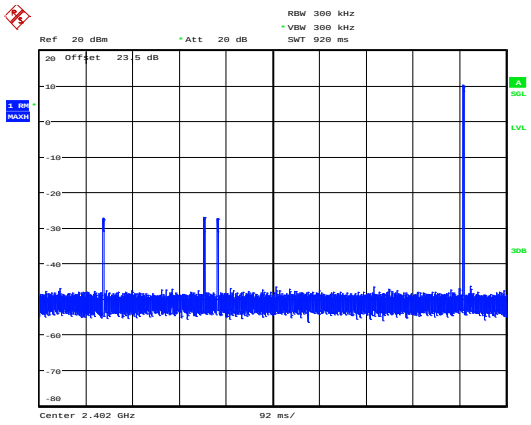
Date: 25.DEC.2013 23:56:09

Dwell Time - Channel 00 DH5



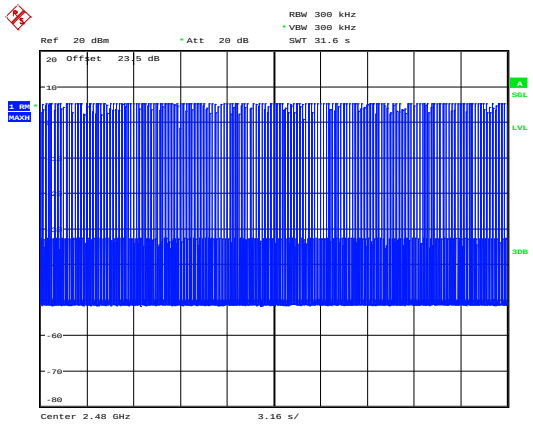
Date: 25.DEC.2013 23:59:51

Frequency Occupation Time - Channel 00 DH5



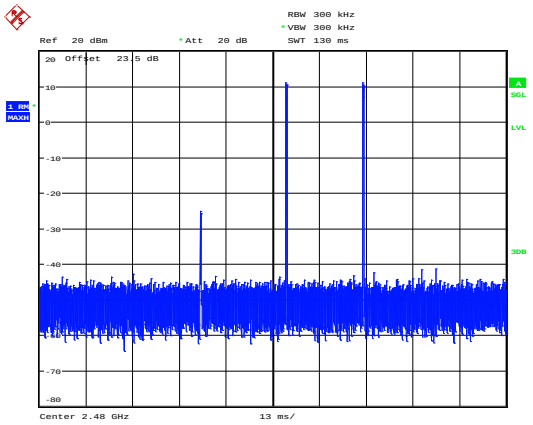
Date: 26.DEC.2013 00:00:00

Dwell Time (ms) - Channel 78 DH1



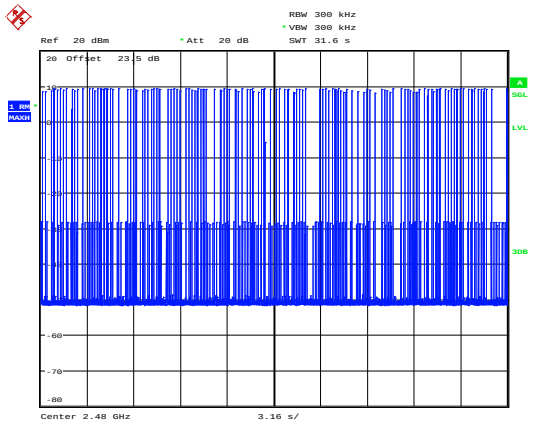
Date: 25.DEC.2013 23:49:03

Frequency Occupation Time - Channel 78 DH1



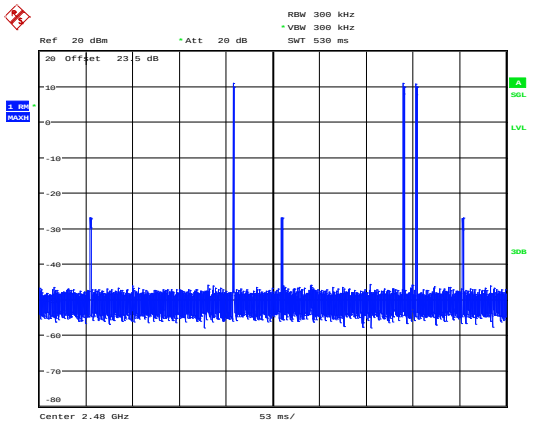
Date: 25.DEC.2013 23:49:12

Dwell Time - Channel 78 DH3



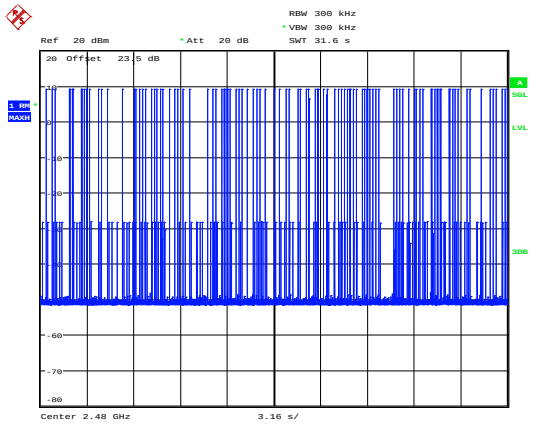
Date: 25.DEC.2013 23:53:12

Frequency Occupation Time - Channel 78 DH3



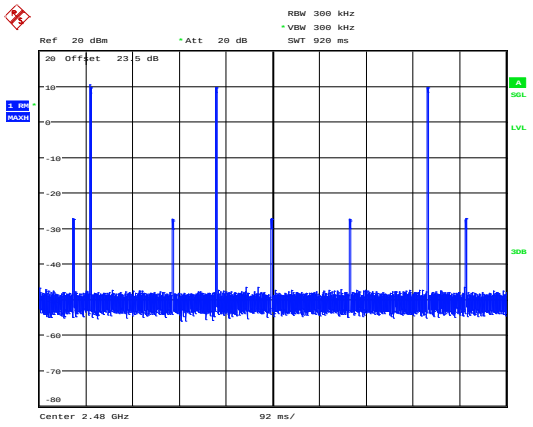
Date: 25.DEC.2013 23:53:21

Dwell Time - Channel 78 DH5



Date: 26.DEC.2013 00:02:46

Frequency Occupation Time - Channel 78 DH5



Date: 26.DEC.2013 00:02:55

3.4.2 Hopping Sequence

3.4.2.1 Limit of Hopping Sequence

SUBCLAUSE 4.3.1.3.2	
TEST CONDITION	**LIMIT**
Non-Adaptive Frequency Hopping Systems	N
Adaptive Frequency Hopping Systems	N Ch 70% of band

N= 15 or 15 divided by the minimum Hopping Frequency Separation in MHz, whichever is the greater.
Remark: Hopping Sequence is not applicable to DSSS/OFDM device.

3.4.2.2 Measuring Instruments

The section 7.0 of List of Measuring Equipment of this test report is used for test.

3.4.2.3 Test Procedures

The measurement procedure follows the clause 5.3.4.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).

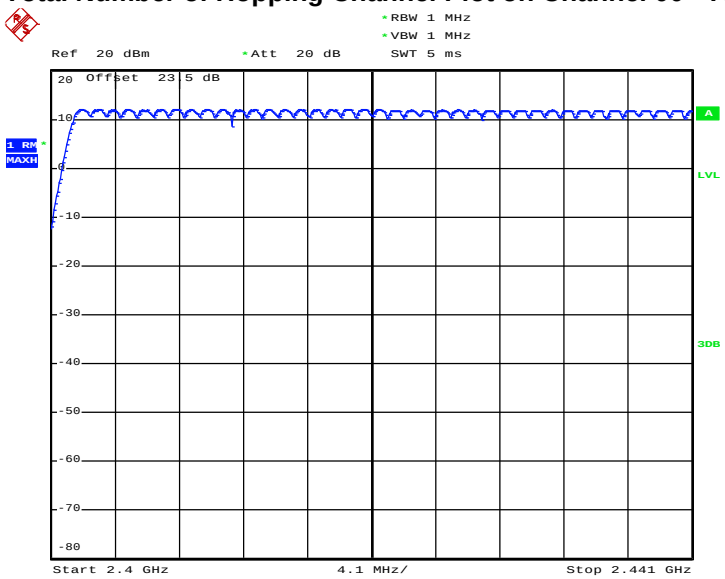
3.4.2.4 Test Setup

3.4.2.5 Test Results

Test Item:	Hopping Sequence	**Temperature :**	24~26℃
Test Engineer :	Alex Lee	**Relative Humidity :**	51~54%

Total Number of Hopping Frequency	Limit of operating channel (at least 70% of band)	Minimum Number of Adaptive Frequency Hopping	Limit of hopping frequencies at all times
79	59	20	15

Total Number of Hopping Channel Plot on Channel 00 - 78



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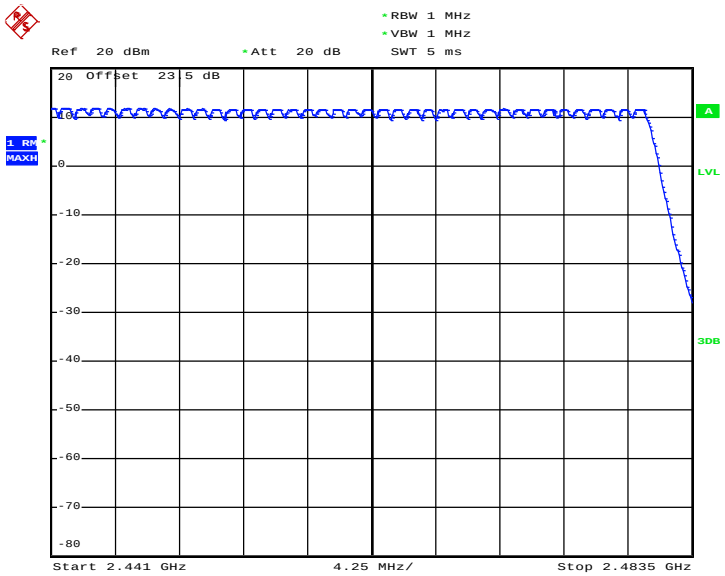


Date: 25.DEC.2013 16:28:56

3.4.3 Hopping Frequency Separation

3.4.4.1 Limit of Hopping Frequency Separation

SUBCLAUSE 4.3.1.4.2	
TEST CONDITION	**LIMIT**
Non-Adaptive Frequency Hopping Systems	MAX [OBW, 100kHz]
Adaptive Frequency Hopping Systems	100kHz

Remark: Hopping Frequency Separation is not applicable to DSSS/OFDM device.

3.4.4.2 Measuring Instruments

The section 7.0 of List of Measuring Equipment of this test report is used for test.

3.4.4.3 Test Procedures

1. These measurements shall only be performed at normal test conditions.
2. The measurement shall be performed on 2 adjacent hopping frequencies.
3. The frequencies on which the test was performed shall be recorded.
4. The measurement procedure follows the clause 5.3.5.2.1.2 Option 2 of the ETSI EN 300 328 V1.8.1 (2012-06).

3.4.4.4 Test Setup

3.4.4.5 Test Results

Test Item :	Frequency Separation	**Temperature :**	24~26℃
Test Engineer :	Alex Lee	**Relative Humidity :**	51~54%

BT	Separation(MHz)	Limit(MHz)
CH 00	0.999	>0.1
CH 78	0.999	>0.1

3.5 Transmitter unwanted emissions in the out-of-band domain

3.5.1 Transmitter unwanted emissions in the out-of-band domain limit

out-of-band domain limit

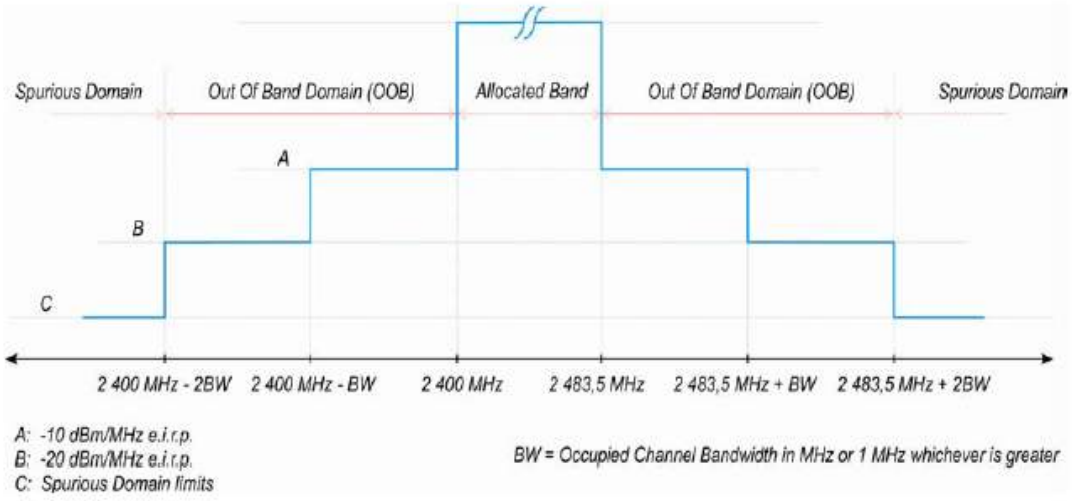


Figure 1: Transmit mask

3.5.2 Measuring Instruments

The measuring equipment is listed in the section 7 of this test report.

3.5.3 Test Procedures

1. The measurement procedure follows the clause 5.3.9.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. The measurements shall be performed at both normal environmental conditions and at the extremes of the operating temperature range.
3. For conducted measurements on devices with multiple transmit chains using the results for each of the transmit chains for the corresponding 1 MHz segments shall be added and compared with the transmit mask limit.

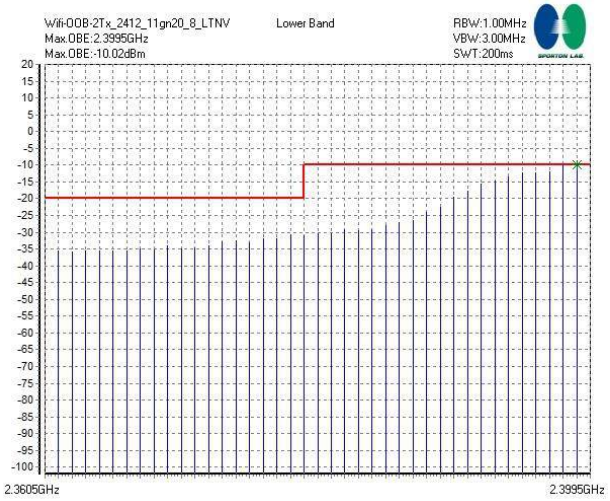
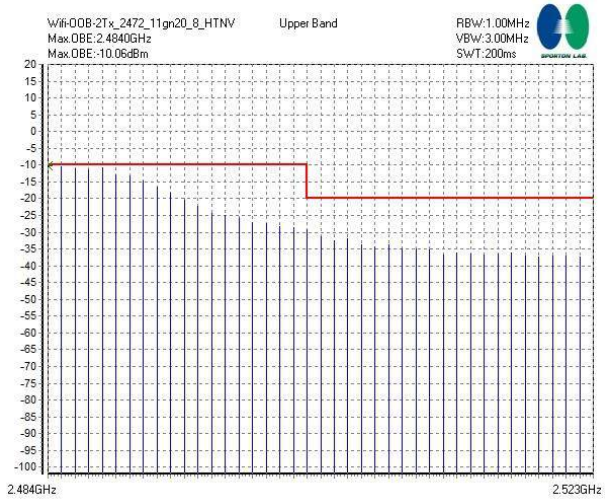
3.5.4 Test Setup

3.5.5 Test Results

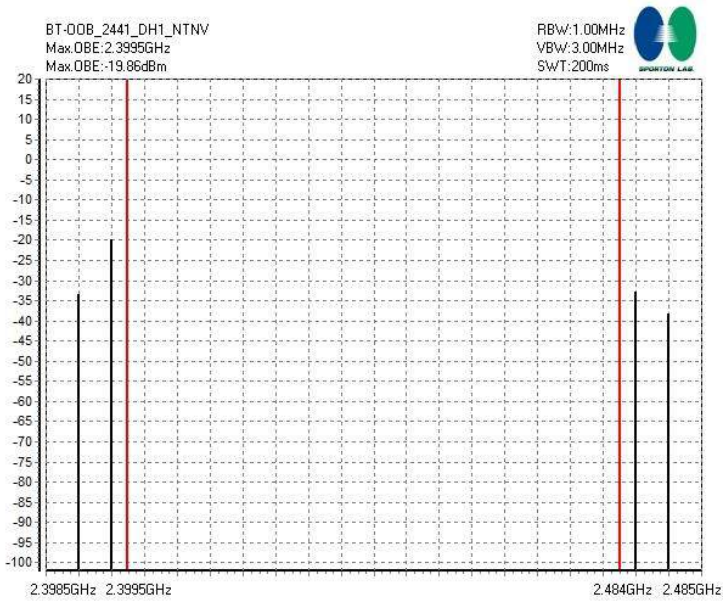
Test Item :	OOB Emissions	Temperature :	24~26℃
Test Engineer :	Alex Lee	Relative Humidity :	51~54%

Mod.	Data Rate	N_{TX}	Channel (Low/High)	Temp. Condition	Low channel OOB Emissions (dBm/MHz)				High channel OOB Emissions (dBm/MHz)				Pass/Fail
					Freq. (MHz)	OOB Freq. (MHz)	Worst Level	Limit	Freq. (MHz)	OOB Freq. (MHz)	Worst Level	Limit	
11b	1Mbps	1	01,13	T nom	2412	2397.5	-26.16	-10	2472	2487	-25.53	-10	Pass
11b	1Mbps	1	01,13	T min	2412	2398.5	-22.29	-10	2472	2486	-24.25	-10	Pass
11b	1Mbps	1	01,13	T max	2412	2397.5	-28.72	-10	2472	2487	-27.08	-10	Pass
11g	6Mbps	1	01,13	T nom	2412	2399.5	-10.83	-10	2472	2484	-11.41	-10	Pass
11g	6Mbps	1	01,13	T min	2412	2399.5	-10.09	-10	2472	2484	-10.32	-10	Pass
11g	6Mbps	1	01,13	T max	2412	2399.5	-11.77	-10	2472	2484	-11.84	-10	Pass
11n HT20	MCS0	1	01,13	T nom	2412	2399.5	-10.45	-10	2472	2484	-10.46	-10	Pass
11n HT20	MCS0	1	01,13	T min	2412	2399.5	-10.1	-10	2472	2484	-10.59	-10	Pass
11n HT20	MCS0	1	01,13	T max	2412	2399.5	-10.91	-10	2472	2484	-10.69	-10	Pass
11n HT40	MCS0	1	03,11	T nom	2422	2398.5	-19.34	-10	2462	2484	-12.35	-10	Pass
11n HT40	MCS0	1	03,11	T min	2422	2395.5	-19.71	-10	2462	2484	-11.54	-10	Pass
11n HT40	MCS0	1	03,11	T max	2422	2399.5	-19.62	-10	2462	2484	-13.51	-10	Pass
BT2.0	1Mbps	1	hop	T nom	hop	2399.5	-19.86	-10	hop	2484	-32.77	-10	Pass
BT2.0	1Mbps	1	hop	T min	hop	2399.5	-19.87	-10	hop	2484	-33.12	-10	Pass
BT2.0	1Mbps	1	hop	T max	hop	2399.5	-20.21	-10	hop	2484	-38.14	-10	Pass
BT2.0	2Mbps	1	hop	T nom	hop	2399.5	-20.86	-10	hop	2484	-36.61	-10	Pass
BT2.0	2Mbps	1	hop	T min	hop	2399.5	-20.09	-10	hop	2484	-36.1	-10	Pass
BT2.0	2Mbps	1	hop	T max	hop	2399.5	-21.45	-10	hop	2484	-36.98	-10	Pass
BT2.0	3Mbps	1	hop	T nom	hop	2399.5	-20.94	-10	hop	2484	-36.47	-10	Pass
BT2.0	3Mbps	1	hop	T min	hop	2399.5	-20.84	-10	hop	2484	-36.57	-10	Pass
BT2.0	3Mbps	1	hop	T max	hop	2399.5	-21.79	-10	hop	2484	-37.07	-10	Pass
BT4.0	1Mbps	1	00,39	T nom	2402	2399.5	-20.04	-10	2480	2484	-33.63	-10	Pass
BT4.0	1Mbps	1	00,39	T min	2402	2399.5	-19.51	-10	2480	2484	-33.4	-10	Pass
BT4.0	1Mbps	1	00,39	T max	2402	2399.5	-20.21	-10	2480	2484	-33.89	-10	Pass

Mod.	Data Rate	N_{TX}	Ant.	Channel (Low/High)	Temp. Condition	Low channel OOB Emissions (dBm/MHz)				High channel OOB Emissions (dBm/MHz)				Pass/Fail
						Freq. (MHz)	OOB Freq. (MHz)	Worst Level	Limit	Freq. (MHz)	OOB Freq. (MHz)	Worst Level	Limit	
11n HT20	MCS0	2	1+2	01,13	T nom	2412	2399.5	-10.57	-10	2472	2484	-10.51	-10	Pass
11n HT20	MCS0	2	1+2	01,13	T min	2412	2399.5	-10.02	-10	2472	2484	-10.27	-10	Pass
11n HT20	MCS0	2	1+2	01,13	T max	2412	2399.5	-10.53	-10	2472	2484	-10.06	-10	Pass

Bluetooth 4.0 – LE and WLAN OOB worse case	
Low channel	High channel
	

Note: Normal and extreme condition can refer to the section 1.7 of this test report.

Bluetooth 2.0 OOB worse case


Note: Normal and extreme condition can refer to the section 1.7 of this test report.

3.6 Transmitter spurious emissions

3.6.1 Limit of Transmitter spurious emissions

Spurious emission limits for transmitter:

SUBCLAUSE 4.3.1.9.2 and 4.3.2.8.2		
FREQUENCY RANGE	**MAXIMUM POWER E.R.P. (≤ 1 GHZ) E.I.R.P. (> 1 GHZ)**	**BANDWIDTH**
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 862 MHz	-54 dBm	100 kHz
862 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

3.6.2 Measuring Instruments

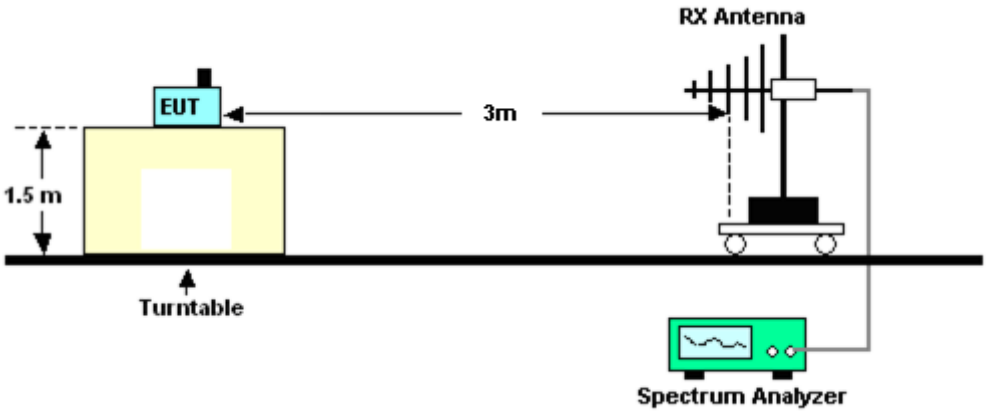
The measuring equipment is listed in the section 7 of this test report.

3.6.3 Test Procedures

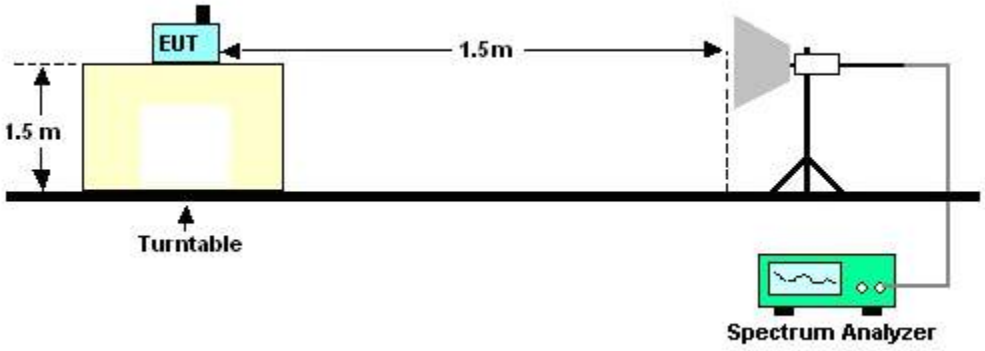
1. The measurement procedure follows the clause 5.3.10.2.2 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. The EUT was placed on a turntable with 1.5m height.
3. The test distance between the receiving antenna and the EUT is 3meter below 1GHz frequency range, and 3 meter for WLAN, 1.5 meter for Bluetooth which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna is kept at 1.5 meter height.
4. Set EUT in continuous transmitting with maximum output power.
5. The table was rotated from 0 to 360 degree to search the highest radiated emission.
6. Repeating step 3 and 4 for each polarization and channel to find the worst emission level.
7. The results obtained are compared to the limits in order to prove compliance with the requirement.

3.6.4 Test Setup

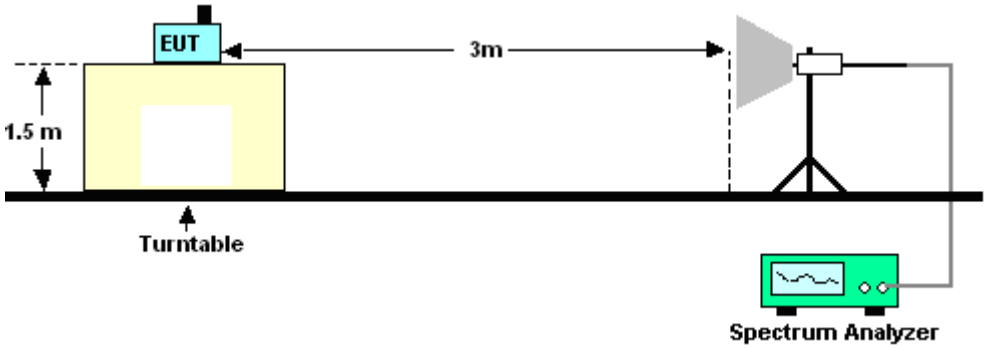
<Below 1GHz>



<Above 1GHz for Bluetooth>

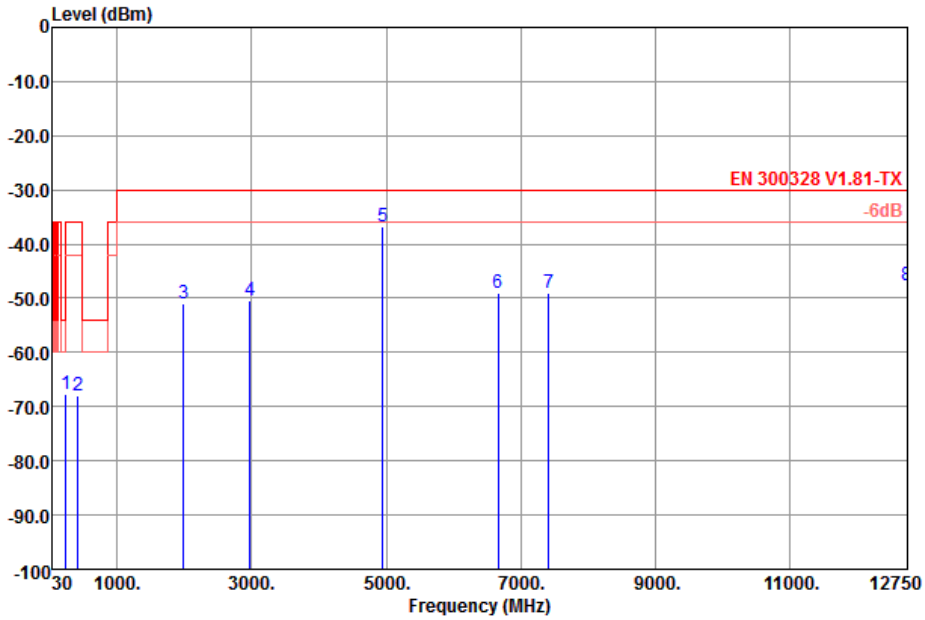


<Above 1GHz for WLAN>



3.6.5 Test Results

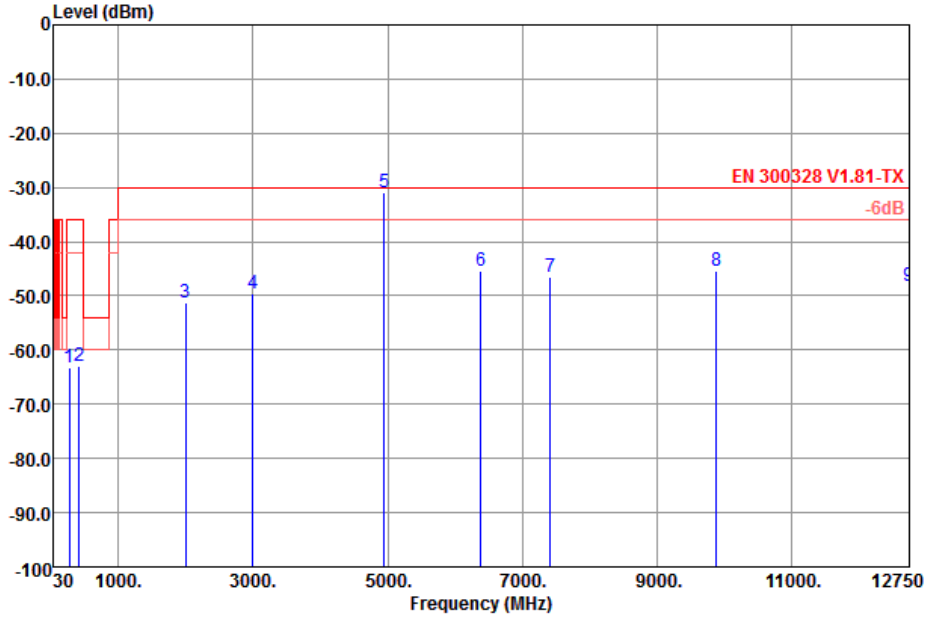
Test Mode :	802.11b CH13 (2472MHz) for Ant. 1	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Horizontal



Condition : EN 300328 V1.81-TX LF EIRP 131014 HORIZONTAL
Project : (ER)3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	240.49	-67.79	-31.79	-36.00	-66.17	-1.62
2	414.12	-68.01	-32.01	-36.00	-70.58	2.57
3	1982.00	-50.95	-20.95	-30.00	-67.39	16.44
4	2978.00	-50.45	-20.45	-30.00	-67.30	16.85
5 p	4946.00	-36.75	-6.75	-30.00	-56.20	19.45
6	6662.00	-48.90	-18.90	-30.00	-71.16	22.26
7	7417.00	-48.94	-18.94	-30.00	-72.46	23.52
8	12744.50	-47.56	-17.56	-30.00	-77.40	29.84

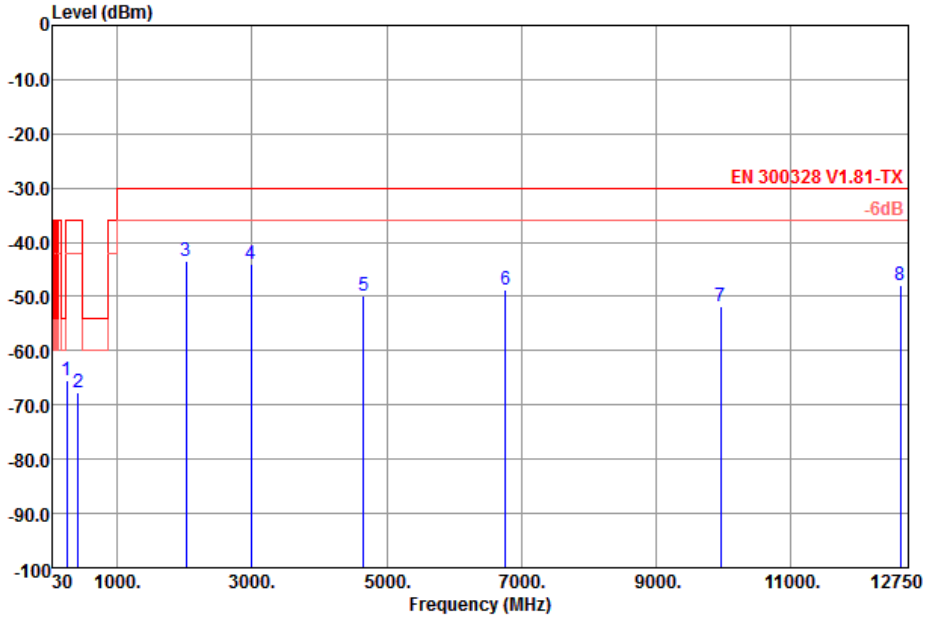
Test Mode :	802.11b CH13 (2472MHz) for Ant. 1	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Vertical



Condition : EN 300328 V1.81-TX LF EIRP 131014 VERTICAL
Project : (ER)3N2752

		Freq	Level	Over Limit	Limit Line	Read Level	Factor
		MHz	dBm	dB	dBm	dBm	dB
1		275.41	-63.28	-27.28	-36.00	-62.63	-0.65
2		414.12	-62.86	-26.86	-36.00	-65.64	2.78
3		1994.00	-51.33	-21.33	-30.00	-67.26	15.93
4		2998.00	-49.52	-19.52	-30.00	-66.56	17.04
5	p	4944.00	-30.97	-0.97	-30.00	-50.46	19.49
6		6386.00	-45.29	-15.29	-30.00	-67.15	21.86
7		7417.00	-46.65	-16.65	-30.00	-70.22	23.57
8		9889.00	-45.46	-15.46	-30.00	-70.18	24.72
9		12747.25	-48.16	-18.16	-30.00	-78.11	29.95

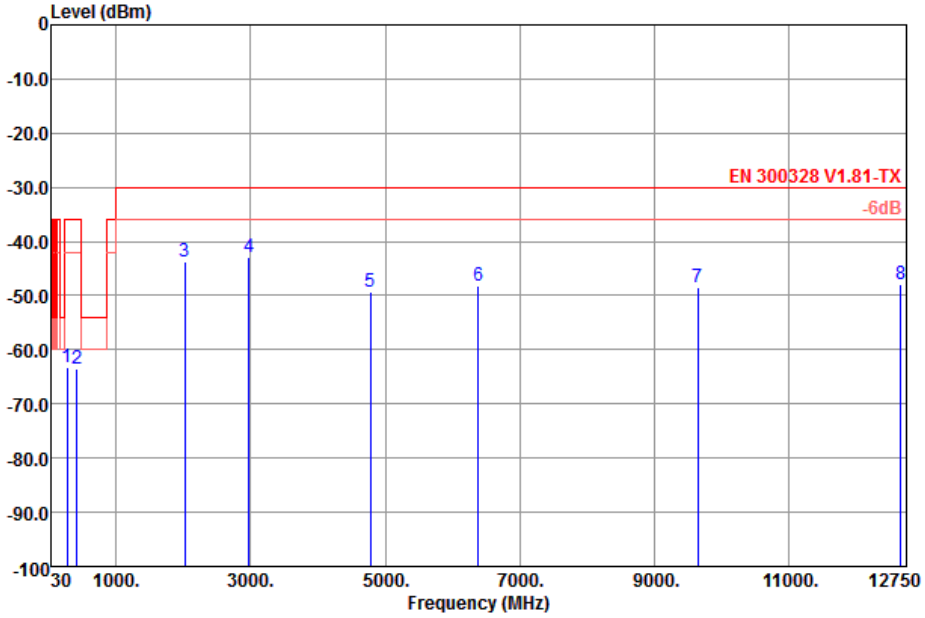
Test Mode :	802.11g CH01 (2412MHz) for Ant. 1	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Horizontal



Condition : EN 300328 V1.81-TX LF EIRP 131014 HORIZONTAL
Project : (ER)3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	248.25	-65.45	-29.45	-36.00	-65.02	-0.43
2	415.09	-67.69	-31.69	-36.00	-70.40	2.71
3 p	2026.00	-43.57	-13.57	-30.00	-60.06	16.49
4	2986.00	-44.04	-14.04	-30.00	-60.98	16.94
5	4656.00	-49.98	-19.98	-30.00	-70.05	20.07
6	6768.00	-48.85	-18.85	-30.00	-71.31	22.46
7	9967.00	-51.72	-21.72	-30.00	-77.31	25.59
8	12629.00	-48.00	-18.00	-30.00	-77.33	29.33

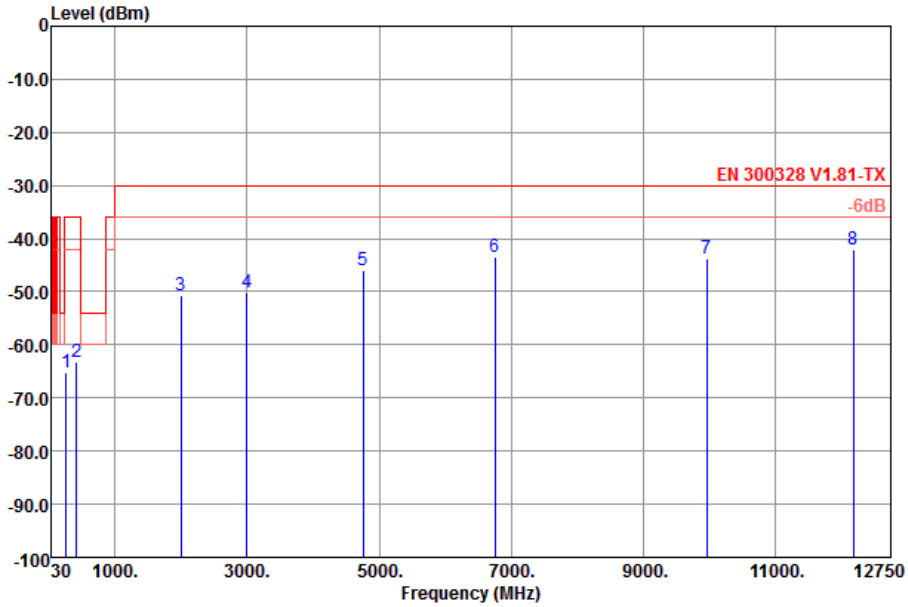
Test Mode :	802.11g CH01 (2412MHz) for Ant. 1	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Vertical



Condition : EN 300328 V1.81-TX LF EIRP 131014 VERTICAL
Project : (ER)3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	275.41	-63.28	-27.28	-36.00	-62.63	-0.65
2	414.12	-63.38	-27.38	-36.00	-66.16	2.78
3	2016.00	-43.82	-13.82	-30.00	-59.84	16.02
4 p	2970.00	-42.87	-12.87	-30.00	-59.74	16.87
5	4782.00	-49.34	-19.34	-30.00	-69.28	19.94
6	6384.00	-48.30	-18.30	-30.00	-70.16	21.86
7	9649.00	-48.51	-18.51	-30.00	-72.96	24.45
8	12670.25	-47.81	-17.81	-30.00	-77.40	29.59

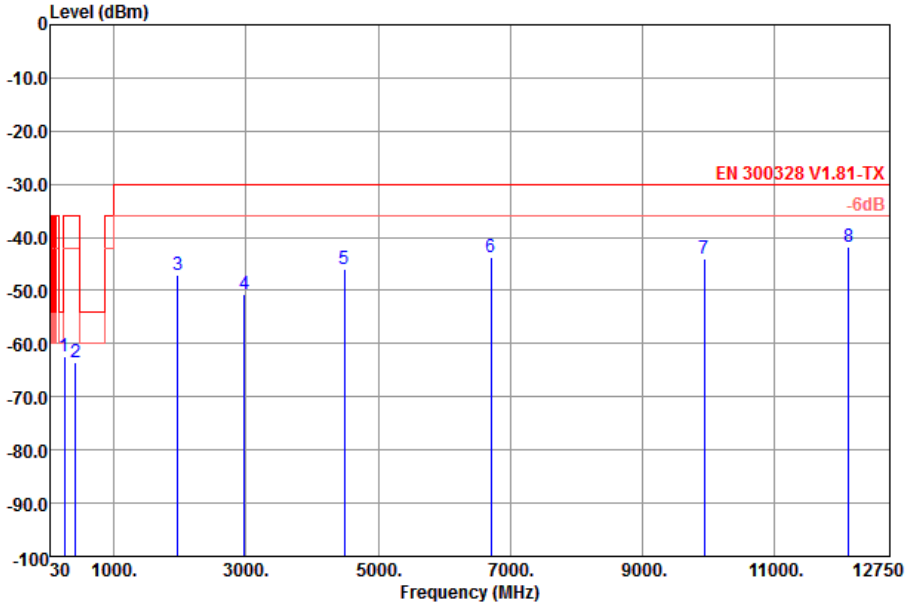
Test Mode :	802.11n HT20 CH01 (2412MHz) for SISO <Ant. 1>	**Temperature :**	21~22℃
Test Engineer :	Pony Chen	**Relative Humidity :**	41~42%
		Polarization :	Horizontal



Condition : EN 300328 V1.81-TX LF EIRP 131014 HORIZONTAL
Project : (ER)3N2752

		Freq	Level	Over Limit	Limit Line	Read Level	Factor
		MHz	dBm	dB	dBm	dBm	dB
1		255.04	-65.08	-29.08	-36.00	-65.36	0.28
2		415.09	-63.17	-27.17	-36.00	-65.88	2.71
3		1994.00	-50.76	-20.76	-30.00	-67.20	16.44
4		2998.00	-50.17	-20.17	-30.00	-67.19	17.02
5		4758.00	-45.82	-15.82	-30.00	-68.88	23.06
6		6760.00	-43.53	-13.53	-30.00	-69.86	26.33
7		9964.00	-43.72	-13.72	-30.00	-75.84	32.12
8	p	12186.25	-41.98	-11.98	-30.00	-75.76	33.78

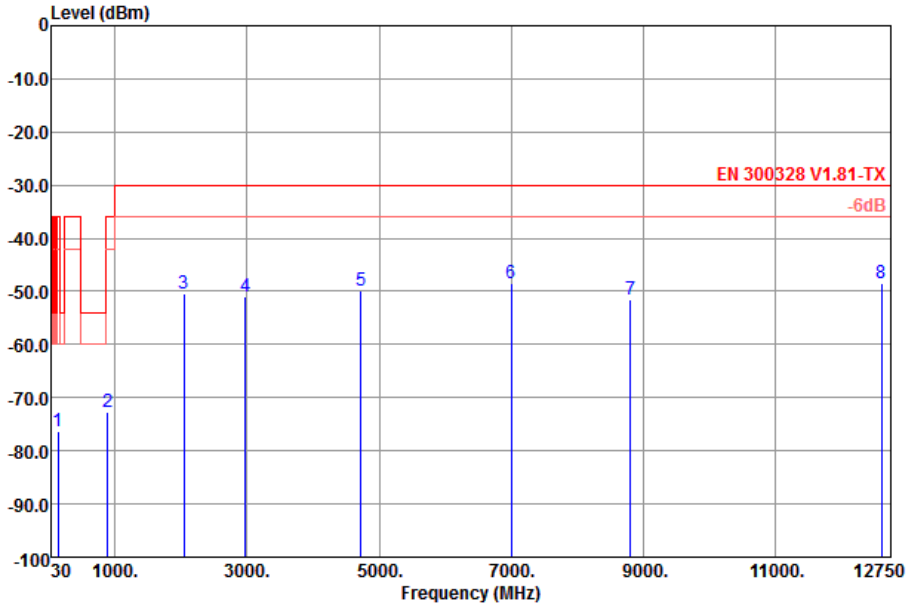
Test Mode :	802.11n HT20 CH01 (2412MHz) for SISO <Ant. 1>	**Temperature :**	21~22℃
Test Engineer :	Pony Chen	**Relative Humidity :**	41~42%
		Polarization :	Vertical



Condition : EN 300328 V1.81-TX LF EIRP 131014 VERTICAL
Project : (ER)3N2752

		Freq	Level	Over Limit	Limit Line	Read Level	Factor
		MHz	dBm	dB	dBm	dBm	dB
1		247.28	-62.47	-26.47	-36.00	-61.75	-0.72
2		415.09	-63.42	-27.42	-36.00	-66.39	2.97
3		1970.00	-47.13	-17.13	-30.00	-62.82	15.69
4		2976.00	-50.81	-20.81	-30.00	-67.68	16.87
5		4490.00	-46.02	-16.02	-30.00	-68.88	22.86
6		6708.00	-43.63	-13.63	-30.00	-69.73	26.10
7		9943.00	-44.00	-14.00	-30.00	-75.62	31.62
8	p	12125.75	-41.79	-11.79	-30.00	-75.41	33.62

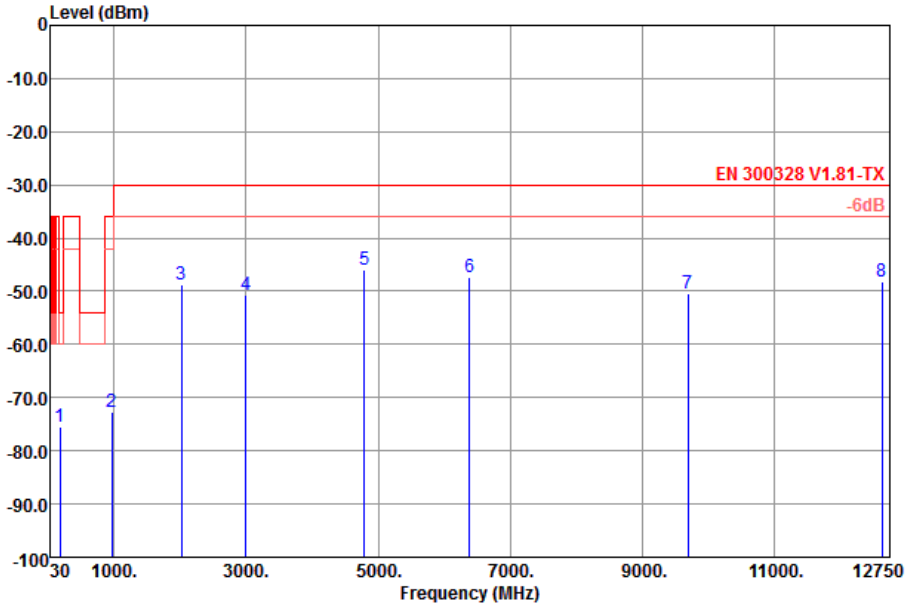
Test Mode :	802.11n HT40 CH03 (2422MHz) for Ant. 1	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Horizontal



Condition : EN 300328 V1.81-TX LF EIRP 131014 HORIZONTAL
Project : (ER)3N2752

		Freq	Level	Over Limit	Limit Line	Read Level	Factor
		MHz	dBm	dB	dBm	dBm	dB
1		135.73	-76.40	-40.40	-36.00	-74.84	-1.56
2		890.39	-72.82	-36.82	-36.00	-80.05	7.23
3		2038.00	-50.52	-20.52	-30.00	-66.84	16.32
4		2978.00	-50.98	-20.98	-30.00	-67.83	16.85
5		4720.00	-49.94	-19.94	-30.00	-69.91	19.97
6	p	7000.00	-48.35	-18.35	-30.00	-71.31	22.96
7		8809.00	-51.56	-21.56	-30.00	-75.50	23.94
8		12607.00	-48.46	-18.46	-30.00	-77.61	29.15

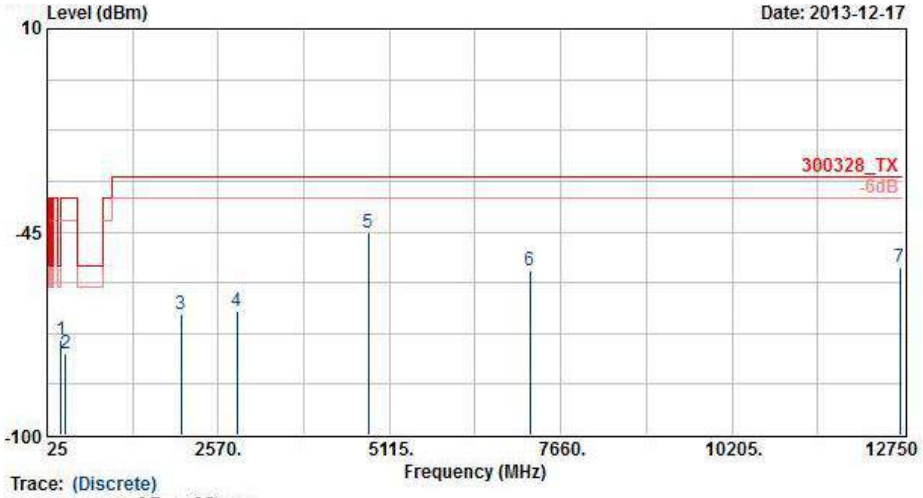
Test Mode :	802.11n HT40 CH03 (2422MHz) for Ant. 1	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Vertical



Condition : EN 300328 V1.81-TX LF EIRP 131014 VERTICAL
Project : (ER)3N2752

		Freq	Level	Over Limit	Limit Line	Read Level	Factor
		MHz	dBm	dB	dBm	dBm	dB
1		186.17	-75.55	-21.55	-54.00	-70.21	-5.34
2		961.20	-72.59	-36.59	-36.00	-81.20	8.61
3		2020.00	-48.88	-18.88	-30.00	-64.90	16.02
4		2992.00	-50.74	-20.74	-30.00	-67.70	16.96
5	p	4788.00	-46.08	-16.08	-30.00	-66.02	19.94
6		6390.00	-47.42	-17.42	-30.00	-69.29	21.87
7		9688.00	-50.52	-20.52	-30.00	-74.87	24.35
8		12637.25	-48.30	-18.30	-30.00	-77.67	29.37

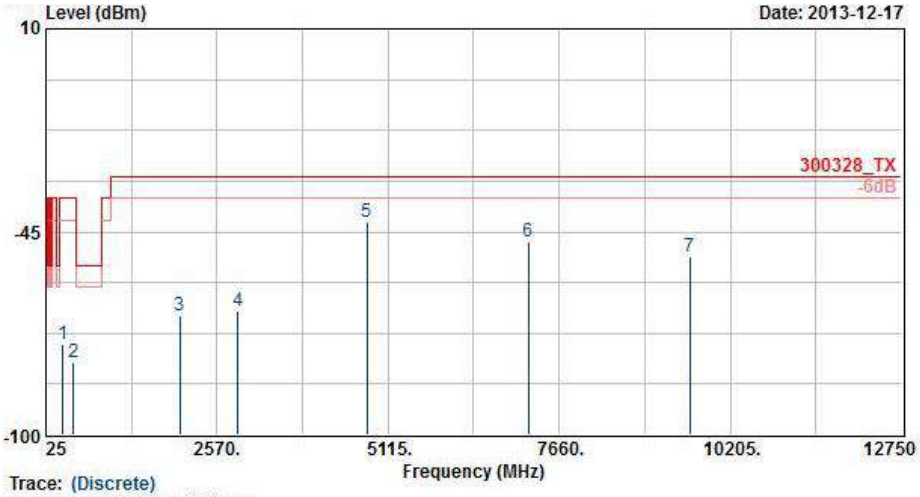
Test Mode :	Bluetooth (1Mbps) CH00 (2402MHz) for Ant. 1	Temperature :	23~24℃
Test Engineer :	Eason Huang	Relative Humidity :	43~44%
		Polarization :	Horizontal



Site : 05CH02-HY
Condition : 300328_TX HORIZONTAL
Power : From System
Project : ER 3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	232.625	-74.21	-38.21	-36.00	-69.18	-5.03	HORIZONTAL
2	303.500	-77.80	-41.80	-36.00	-75.22	-2.58	HORIZONTAL
3	2016.000	-67.26	-37.26	-30.00	-73.72	6.46	HORIZONTAL
4	2846.000	-66.50	-36.50	-30.00	-75.06	8.57	HORIZONTAL
5	4803.000	-45.32	-15.32	-30.00	-60.13	14.81	HORIZONTAL
6	7203.000	-55.58	-25.58	-30.00	-77.12	21.54	HORIZONTAL
7	12705.000	-54.65	-24.65	-30.00	-81.34	26.69	HORIZONTAL

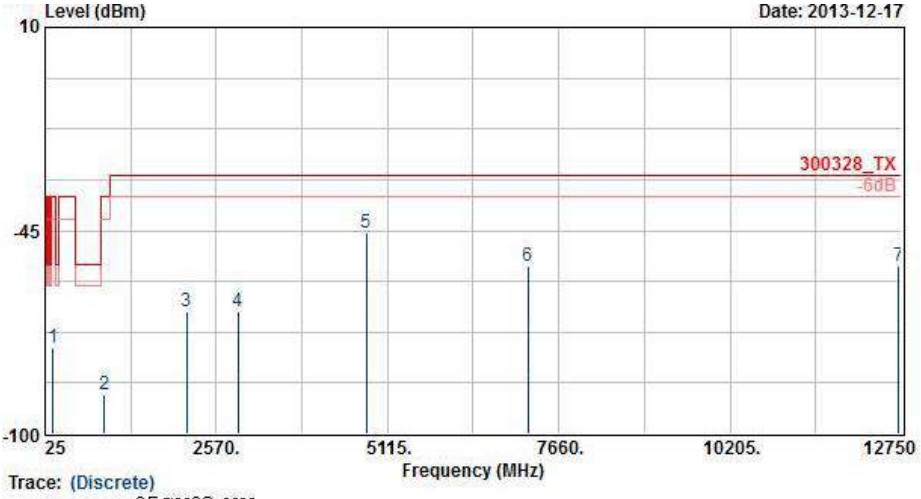
Test Mode :	Bluetooth (1Mbps) CH00 (2402MHz) for Ant. 1	**Temperature :**	23~24℃
Test Engineer :	Eason Huang	**Relative Humidity :**	43~44%
		Polarization :	Vertical



Site : 05CH02-HY
Condition : 300328_TX VERTICAL
Power : From System
Project : ER 3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	280.200	-75.27	-39.27	-36.00	-72.67	-2.60	VERTICAL
2	431.600	-80.24	-44.24	-36.00	-81.40	1.16	VERTICAL
3	2016.000	-67.53	-37.53	-30.00	-73.99	6.46	VERTICAL
4	2880.000	-66.27	-36.27	-30.00	-74.82	8.55	VERTICAL
5 @	4803.000	-42.33	-12.33	-30.00	-57.14	14.81	VERTICAL
6	7203.000	-47.49	-17.49	-30.00	-69.04	21.54	VERTICAL
7	9603.750	-51.55	-21.55	-30.00	-74.03	22.48	VERTICAL

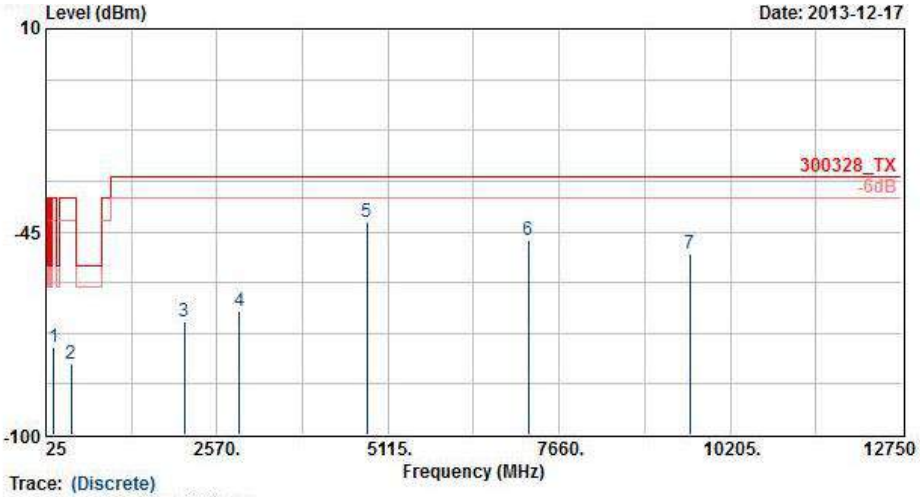
Test Mode :	Bluetooth 4.0 - LE CH00 (2402MHz) for Ant. 1	Temperature :	23~24℃
Test Engineer :	Eason Huang	Relative Humidity :	43~44%
		Polarization :	Horizontal



Site : 05CH02-HY
Condition : 300328_TX HORIZONTAL
Power : From System
Project : ER 3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	144.075	-76.71	-40.71	-36.00	-72.82	-3.89	HORIZONTAL
2	902.700	-89.50	-53.50	-36.00	-94.45	4.95	HORIZONTAL
3	2126.000	-67.05	-37.05	-30.00	-73.81	6.76	HORIZONTAL
4	2890.000	-66.81	-36.81	-30.00	-75.35	8.55	HORIZONTAL
5	4803.000	-45.42	-15.42	-30.00	-60.23	14.81	HORIZONTAL
6	7203.000	-54.76	-24.76	-30.00	-76.31	21.54	HORIZONTAL
7	12712.500	-54.59	-24.59	-30.00	-81.31	26.72	HORIZONTAL

Test Mode :	Bluetooth 4.0 - LE CH00 (2402MHz) for Ant. 1	**Temperature :**	23~24℃
Test Engineer :	Eason Huang	**Relative Humidity :**	43~44%
		Polarization :	Vertical



Site : 05CH02-HY
Condition : 300328_TX VERTICAL
Power : From System
Project : ER 3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	Pol/Phase
	MHz	dBm	dB	dBm	dBm	dB	
1	143.525	-76.22	-40.22	-36.00	-72.33	-3.89	VERTICAL
2	398.700	-80.84	-44.84	-36.00	-80.95	0.11	VERTICAL
3	2086.000	-69.28	-39.28	-30.00	-75.94	6.66	VERTICAL
4	2902.000	-66.60	-36.60	-30.00	-75.13	8.54	VERTICAL
5 @	4803.000	-42.26	-12.26	-30.00	-57.07	14.81	VERTICAL
6	7203.000	-47.21	-17.21	-30.00	-68.75	21.54	VERTICAL
7	9603.750	-51.10	-21.10	-30.00	-73.59	22.48	VERTICAL

4 Receiver Parameters

4.1 Receiver spurious emissions

4.1.1 Limit of Receiver spurious emissions

FHSS spurious emission limits for receivers:

SUBCLAUSE 4.3.1.10.2		
FREQUENCY RANGE	**MAXIMUM POWER E.R.P. (≤ 1 GHZ) E.I.R.P. (> 1 GHZ)**	**MEASUREMENT BANDWIDTH**
30 MHz to 1 GHz	-57 dBm	100kHz
1 GHz to 12,75 GHz	-47 dBm	1MHz

WLAN spurious emission limits for receivers

SUBCLAUSE 4.3.2.9		
FREQUENCY RANGE	**MAXIMUM POWER, E.R.P.**	**MEASUREMENT BANDWIDTH**
30 MHz to 1 GHz	-57 dBm	100kHz
1 GHz to 12,75 GHz	-47 dBm	1MHz

4.1.2 Measuring Instruments

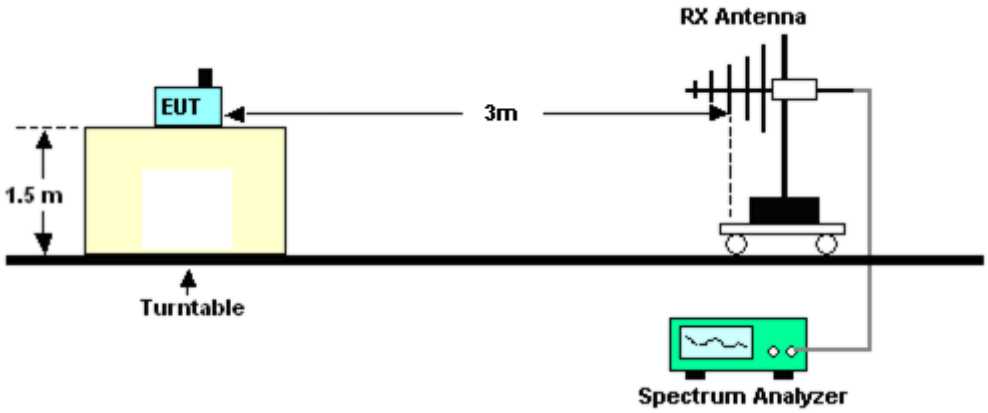
The measuring equipment is listed in the section 7 of this test report.

4.1.3 Test Procedures

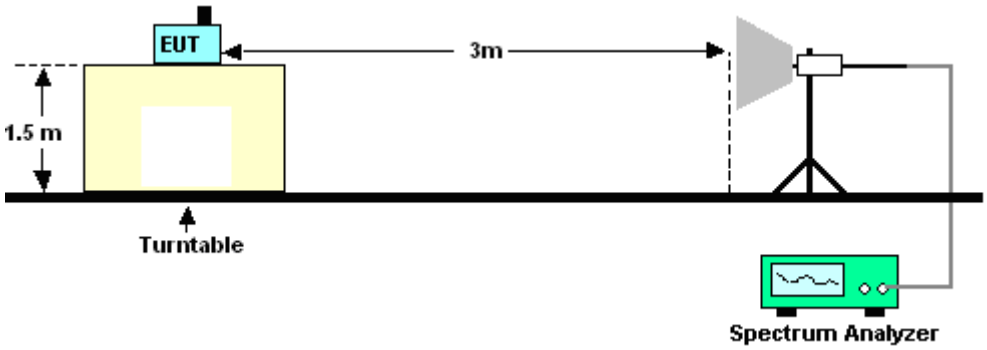
1. The measurement procedure follows the clause 5.3.11.2.2 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. The EUT was placed on a turntable with 1.5m height.
3. The test distance between the receiving antenna and the EUT is 3meter below 1GHz frequency range, and 3 meter which is in far field test condition for measured frequency above 1GHz, while the receiving (test) antenna is kept at 1.5 meter height.
4. Set EUT in receiving mode.
5. The table was rotated from 0 to 360 degree to search the highest radiated emission.
6. Repeating step 3 and 4 for each polarization and channel to find the worst emission level.
7. The results obtained are compared to the limits in order to prove compliance with the requirement.

4.1.4 Test Setup

<Below 1GHz>

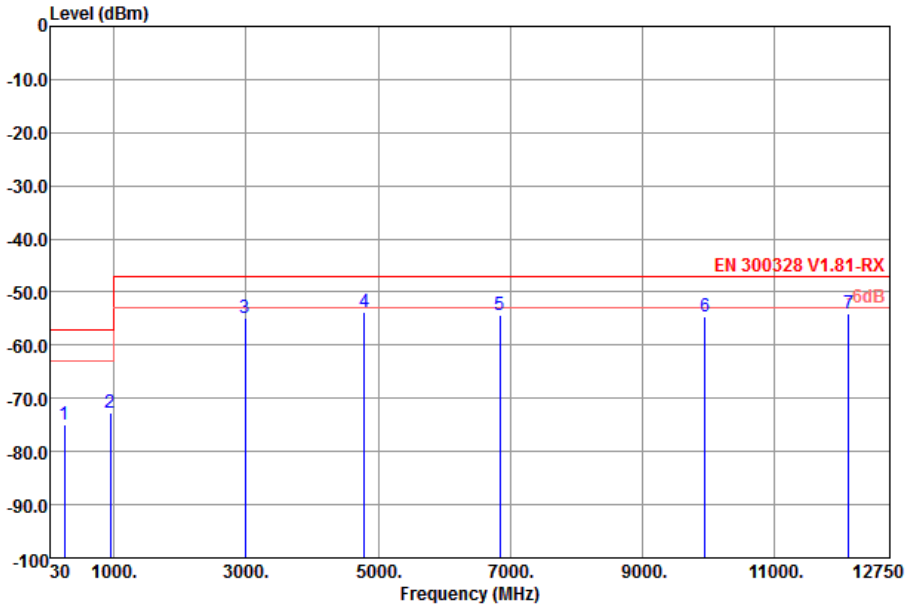


<Above 1GHz>



4.1.5 Test Results

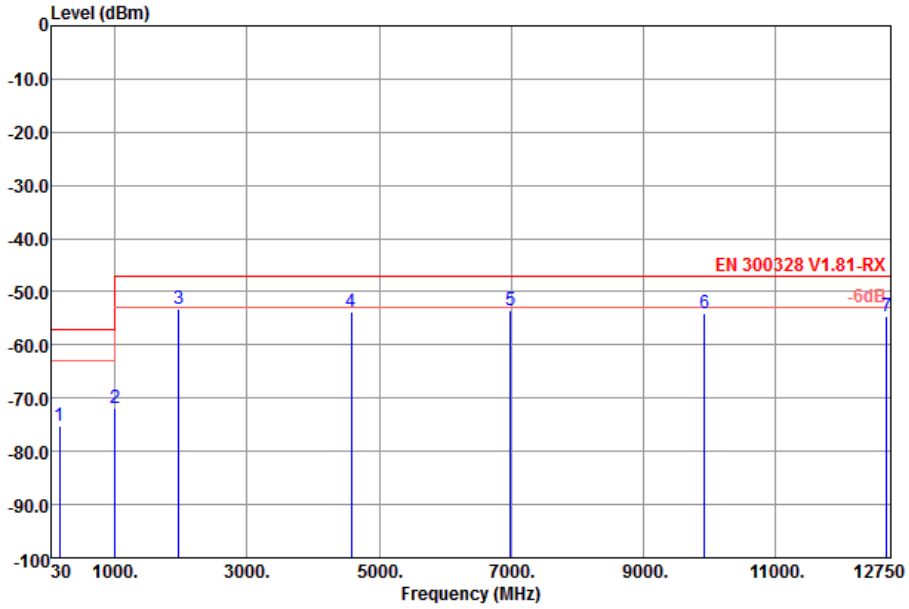
Test Mode :	802.11n HT20 CH01 (2412MHz) for SISO <Ant. 1>	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Horizontal



Condition : EN 300328 V1.81-RX LF EIRP 131014 HORIZONTAL
Project : (ER)3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	245.34	-75.06	-18.06	-57.00	-74.33	-0.73
2	942.77	-72.64	-15.64	-57.00	-80.77	8.13
3	2988.00	-54.78	-7.78	-47.00	-75.13	20.35
4 p	4790.00	-53.85	-6.85	-47.00	-76.82	22.97
5	6848.00	-54.30	-7.30	-47.00	-80.51	26.21
6	9946.00	-54.47	-7.47	-47.00	-86.32	31.85
7	12123.00	-53.91	-6.91	-47.00	-87.82	33.91

Test Mode :	802.11n HT20 CH01 (2412MHz) for SISO <Ant. 1>	Temperature :	21~22℃
Test Engineer :	Pony Chen	Relative Humidity :	41~42%
		Polarization :	Vertical



Condition : EN 300328 V1.81-RX LF EIRP 131014 VERTICAL
Project : (ER)3N2752

	Freq	Level	Over Limit	Limit Line	Read Level	Factor
	MHz	dBm	dB	dBm	dBm	dB
1	157.07	-75.28	-18.28	-57.00	-72.34	-2.94
2	997.09	-71.88	-14.88	-57.00	-80.72	8.84
3 p	1970.00	-53.19	-6.19	-47.00	-71.75	18.56
4	4582.00	-53.86	-6.86	-47.00	-77.06	23.20
5	6986.00	-53.51	-6.51	-47.00	-79.41	25.90
6	9931.00	-54.01	-7.01	-47.00	-85.34	31.33
7	12692.25	-54.72	-7.72	-47.00	-89.65	34.93

5 Adaptivity Test

5.1 Adaptivity and Receiver Blocking

5.1.1 Limit of Adaptivity and Receiver Blocking

Only for adaptive systems and RF Output Power > 10 dBm
LBT based Detect and Avoid (Load Based Equipment with spectrum sharing mechanism IEEE Std.):
LBT based spectrum sharing mechanism may implement IEEE Std. 802.11-2007 clauses 15, 17, 18 or 19, in IEEE Std. 802.11n-2009, clause 20 or in IEEE Std. 802.15.4-2006,
Short Control Signaling Transmissions shall have a maximum duty cycle of 10 % within an observation period of 50 ms.

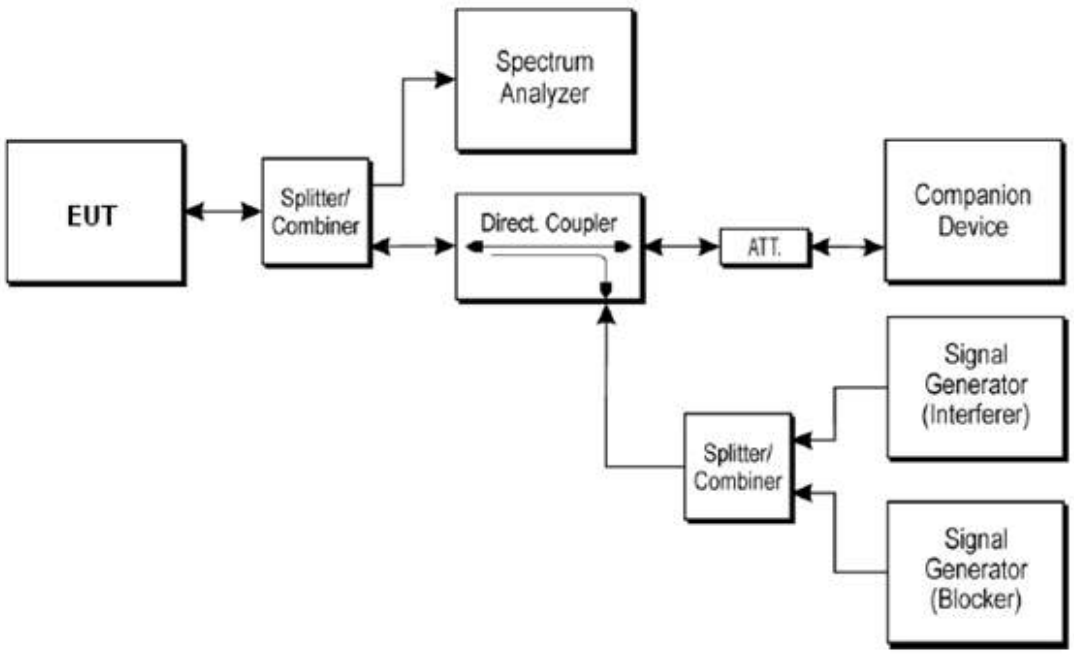
5.1.2 Measurement Instruments

The measuring equipment is listed in the section 7 of this test report.

5.1.3 Test Procedures

1. The measurement procedure follows the clause 5.3.7.2.1 of the ETSI EN 300 328 V1.8.1 (2012-06).
2. For conducted measurements on devices with multiple transmit chains and receive chains. The power splitter/combiner shall be used to combine all the transmit/receive chains (antenna outputs) into a single test point. The insertion loss of the power splitter/combiner shall be taken into account.

5.1.4 Test Setup



5.1.5 Support Unit used in test configuration and system

Item	Instrument	Manufacturer	Model No.	Characteristics
1.	WLAN AP	D-Link	DIR-855	Dual Band AP
2.	Notebook	Lenovo	E335	FTP / LAN

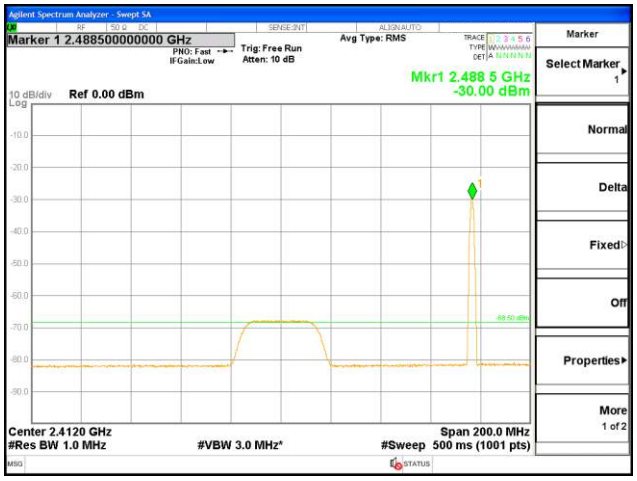
5.1.6 Test Results of Adaptivity and Receiver Blocking

	Modulation	Data Rate (single)	Nominal Bandwidth	Channel	Test Frequency	Test Result
WIFI 2.4GHz	802.11b	11Mbit/s	20MHz	01	2412 MHz	PASS
				13	2472 MHz	PASS
	802.11g	54Mbit/s	20MHz	01	2412 MHz	PASS
				13	2472 MHz	PASS
	802.11n HT20	65Mbit/s	20MHz	01	2412 MHz	PASS
				13	2472 MHz	PASS
	802.11n HT40	135 Mbit/s	40MHz	03	2422 MHz	PASS
				11	2462 MHz	PASS

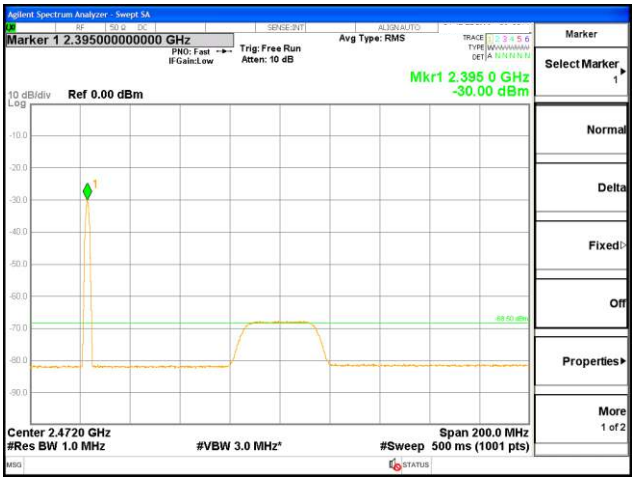
Note: The CCA time is declared by the manufacturer.

	Modulation	Data Rate (single)	Nominal Bandwidth	Channel	Test Frequency	Test Result
BT	FHSS	DH5	1MHz	00	2402 MHz	PASS
				78	2480 MHz	PASS

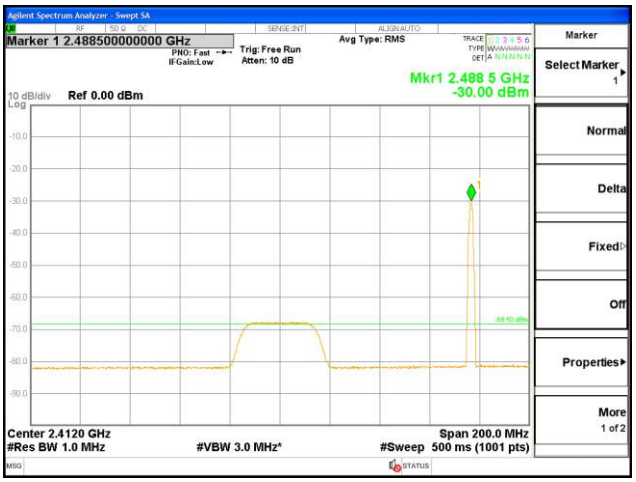
5.1.7 Test Plots of Adaptivity Test

<table>
<tr><th colspan="2">802.11b 2412MHz</th></tr>
<tr><td>Maximum Channel Occupancy Time = 12.49ms</td><td>Minimum Idle Period = 446.4 μs</td></tr>
<tr><td>
</td><td>
</td></tr>
<tr><td>Detection Level = -68.50dBm/MHz
Interference dwell time = 60 seconds</td><td>Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle</td></tr>
<tr><td> 
</td><td>
</td></tr>
</table>

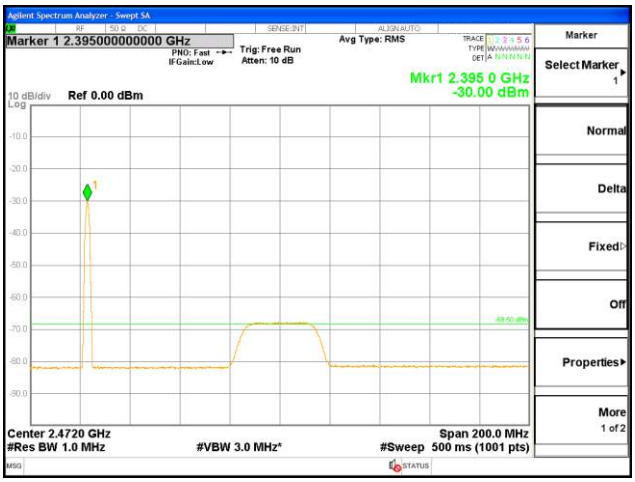
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11b 2472MHz	
Maximum Channel Occupancy Time = 12.49ms	Minimum Idle Period = 394.4 μs
Detection Level = -68.50 dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

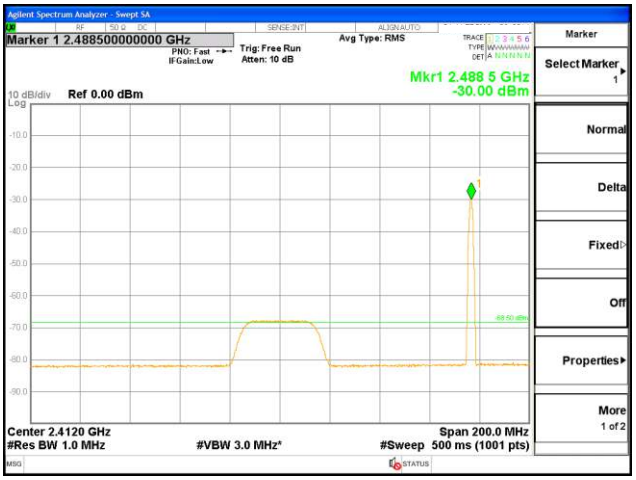
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11g 2412MHz	
Maximum Channel Occupancy Time = 2.073ms	Minimum Idle Period = 115.5 μ s
Detection Level = -68.50dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

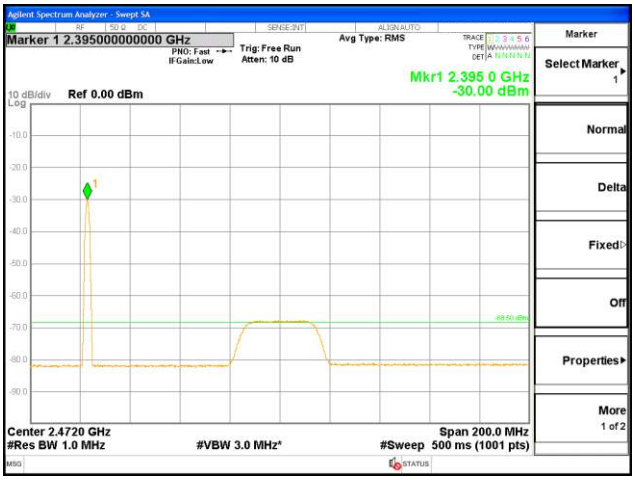
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11g 2472MHz	
Maximum Channel Occupancy Time = 2.074ms	Minimum Idle Period = 115.3 μ s
Detection Level = -68.50dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

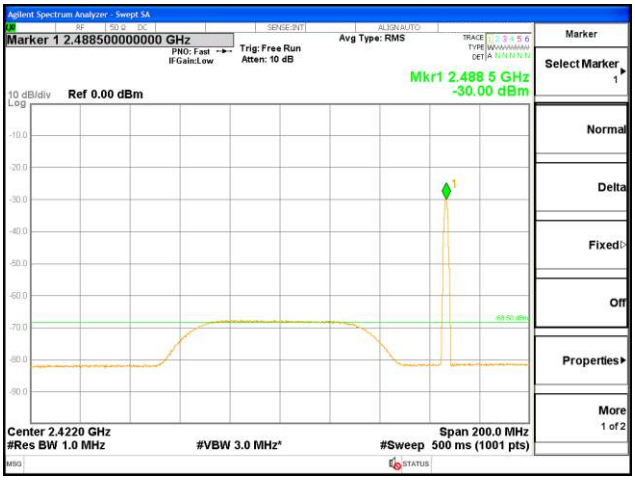
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11n HT20 2412MHz	
Maximum Channel Occupancy Time = 3.358ms	Minimum Idle Period = 150.5 μs
Detection Level = -68.50dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

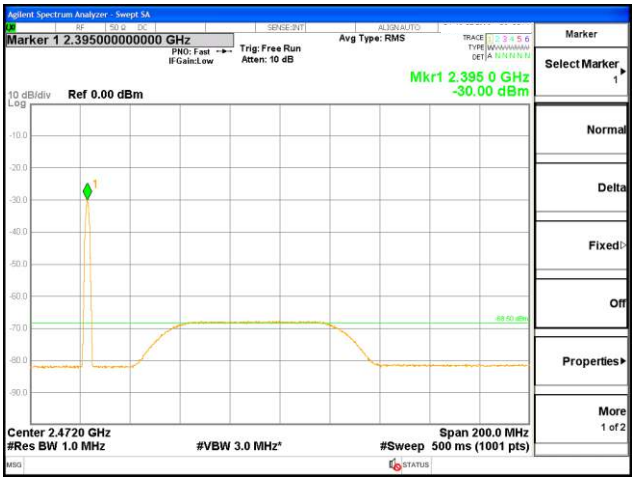
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11n HT20 2472MHz	
Maximum Channel Occupancy Time = 4.470ms	Minimum Idle Period = 157.0 μs
Detection Level = -68.50dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

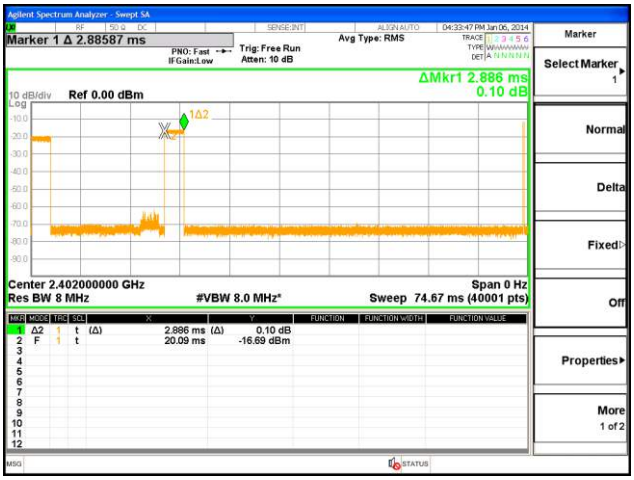
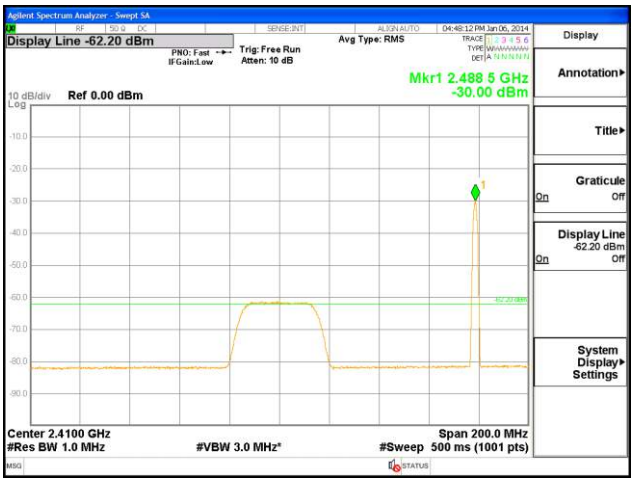
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11n HT40 2422MHz	
Maximum Channel Occupancy Time = 1.639ms	Minimum Idle Period = 192.4 μs
Detection Level = -68.50dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

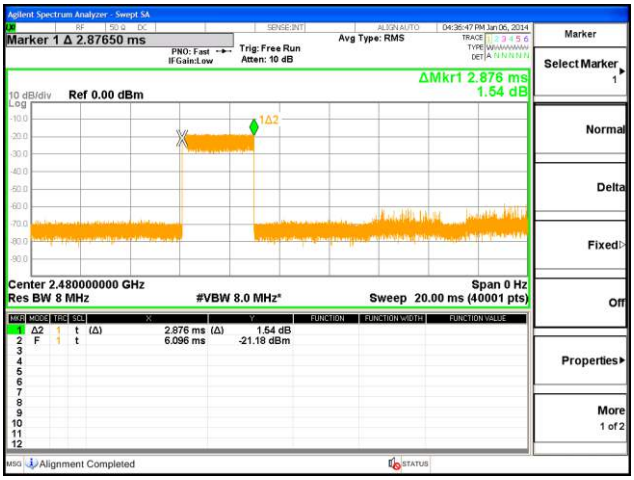
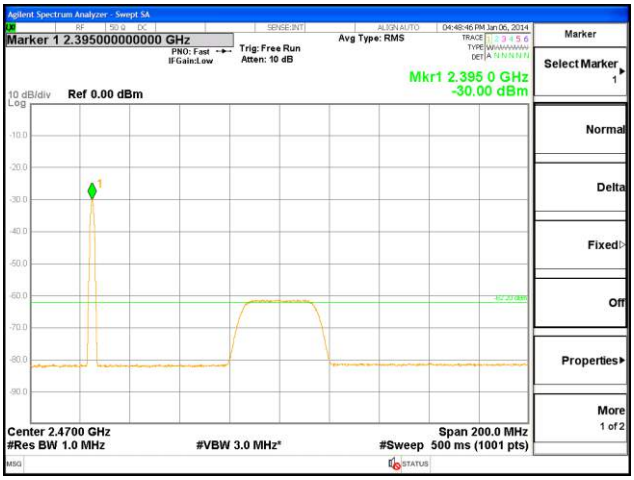
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

802.11n HT40 2462MHz	
Maximum Channel Occupancy Time = 1.458ms	Minimum Idle Period = 156.4 μs
Detection Level = -68.50dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

Bluetooth2.0 2402MHz	
Maximum Channel Occupancy Time = 2.886ms	Minimum Idle Period = 817.6 μ s
	
Detection Level = -62.20dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

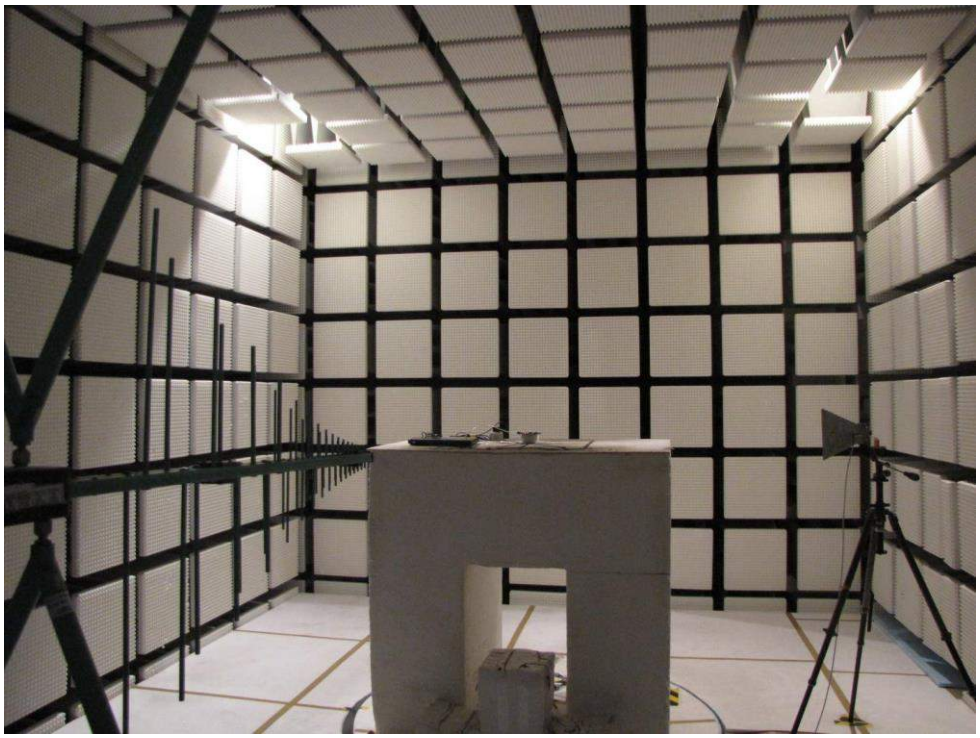
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

Bluetooth2.0 2480MHz	
Maximum Channel Occupancy Time = 2.876ms	Minimum Idle Period = 4.564ms
	
Detection Level = -62.20dBm/MHz Interference dwell time = 60 seconds	Transmission abort within Maximum Channel Occupancy Time after interference added and the short control signaling is less than 10% duty cycle
	

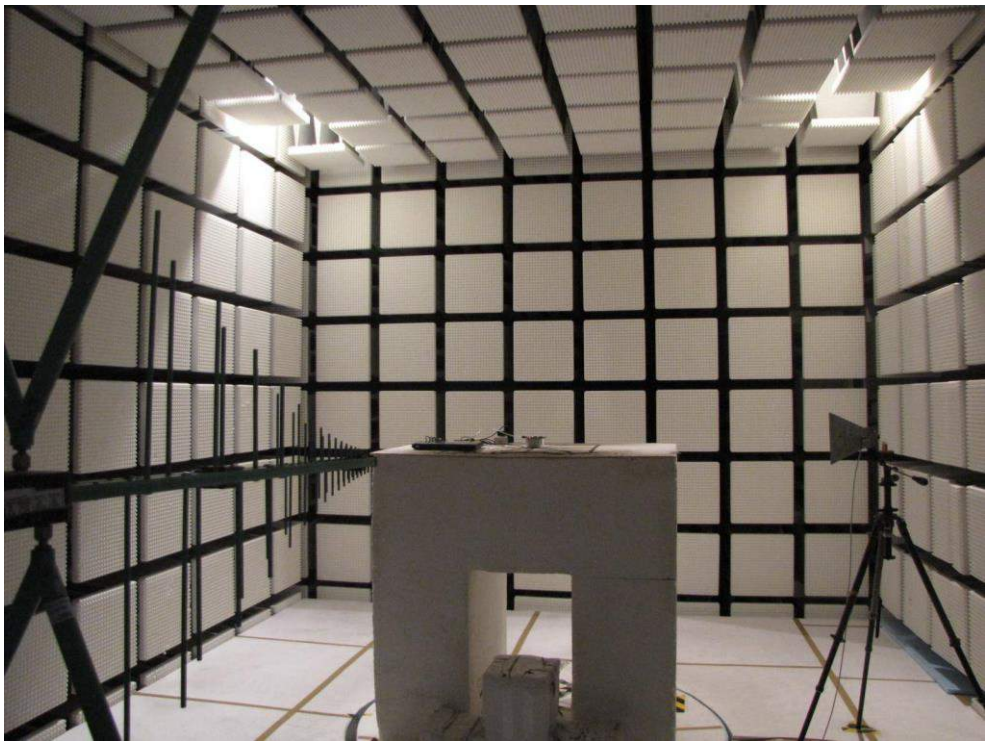
Note: Detection Level = -70 + 20 – EIRP + Gain for conducted measurement.

6 Photographs of Radiated Emission Test Configuration

Bluetooth Tx/Rx Mode



Bluetooth4.0-LE Tx/Rx Mode



WLAN Tx/Rx Mode

<LF>

<HF>

7 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Dec. 04, 2013~ Dec. 25, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Sensor	D.A.R.E	RPR3006	13I00030SNO06	9kHz~6GHz	Apr. 24, 2013	Dec. 04, 2013~ Dec. 25, 2013	Apr. 23, 2014	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D3SP	TBN-930701	N/A	Jul. 19, 2013	Dec. 04, 2013~ Dec. 25, 2013	Jul. 18, 2014	Conducted (TH02-HY)
Signal Analyzer	Rohde & Schwarz	FSQ	200578/026	20Hz~26.5GHz	Feb. 06, 2013	Dec. 04, 2013~ Dec. 25, 2013	Feb. 05, 2014	Conducted (TH02-HY)
Signal Generator(Interferer)	Rohde & Schwarz	SMJ100A	101375	9kHz~6GHz	Feb. 19, 2013	Jan. 06, 2014	Feb. 18, 2014	Conducted (TH02-HY)
Signal Generator(Blocker)	Agilent	E4438C	MY49070755	250kHz~6GHz	Oct. 08, 2013	Jan. 06, 2014	Oct. 07, 2014	Conducted (TH02-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Mar. 13, 2013	Jan. 06, 2014	Mar. 12, 2014	Conducted (TH02-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	Apr. 17, 2013	Dec. 17, 2013	Apr. 16, 2014	Radiation (05CH02-HY)
Bilog Antenna	Schaffner	CBL6112B	2892	25MHz ~ 2GHz	Oct. 10, 2013	Dec. 17, 2013	Oct. 09, 2014	Radiation (05CH02-HY)
Double Ridged Guide Horn Antenna	COM-POWER	AH118	071027	1GHz ~ 18GHz	Oct. 18, 2013	Dec. 17, 2013	Oct. 17, 2014	Radiation (05CH02-HY)
Amplifier	Langer	EM330	60364	100kHz ~ 3GHz GAIN 30dB	Nov. 10, 2013	Dec. 17, 2013	Nov. 09, 2014	Radiation (05CH02-HY)
Amplifier	Agilent	8449B	3008A02321	1GHz ~ 26.5GHz	Nov. 21, 2013	Dec. 17, 2013	Nov. 20, 2014	Radiation (05CH02-HY)
Antenna Mast	INN-CO	MM 3000	N/A	N/A	N/A	Dec. 17, 2013	N/A	Radiation (05CH02-HY)
Turn Table	INN-CO	DS2000	520604	Degree 0~360	N/A	Dec. 17, 2013	N/A	Radiation (05CH02-HY)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101514	9kHz ~ 40GHz	Apr. 26, 2013	Dec. 18, 2013	Apr. 25, 2014	Radiation (05CH01-HY)
Amplifier	Agilent	8447D	2944A11146	100kHz ~ 1.3GHz	Jul. 05 , 2013	Dec. 18, 2013	Jul. 04 , 2014	Radiation (05CH01-HY)
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	Mar. 27, 2013	Dec. 18, 2013	Mar. 26, 2014	Radiation (05CH01-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2737	25MHz ~ 2GHz	Oct. 18, 2013	Dec. 18, 2013	Oct. 17, 2014	Radiation (05CH01-HY)
Horn Antenna	COM-POWER	AH-118	10091	1GHz ~ 18GHz	Jan. 29, 2013	Dec. 18, 2013	Jan. 28, 2014	Radiation (05CH01-HY)
RF Cable-R03m	Jye Bao	RG142	CB031	30MHz ~ 1GHz	Dec. 01, 2013	Dec. 18, 2013	Nov. 30, 2014	Radiation (05CH01-HY)
RF Cable-10m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	1GHz ~ 26.5GHz	Dec. 01, 2013	Dec. 18, 2013	Nov. 30, 2014	Radiation (05CH01-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170221	15GHz ~ 40GHz	Jan. 08, 2013	Dec. 18, 2013	Jan. 07, 2014	Radiation (05CH01-HY)
Turn Table	HD	DS 420	420/655/12	0 ~ 360 degree	N/A	Dec. 18, 2013	N/A	Radiation (05CH01-HY)
Antenna Mast	HD	MA 240	240/569/12	1 ~ 4 m	N/A	Dec. 18, 2013	N/A	Radiation (05CH01-HY)

8 Uncertainty Evaluation

Test Item	Uncertainty
Occupied Channel Bandwidth	± 0.49 %
RF output power, conducted	±0.61 dB
Power density, conducted	±0.60 dB
Radiated emissions	±2.86 dB
Temperature	±0.8 ℃
Humidity	±3 %
Time	±0.33 %